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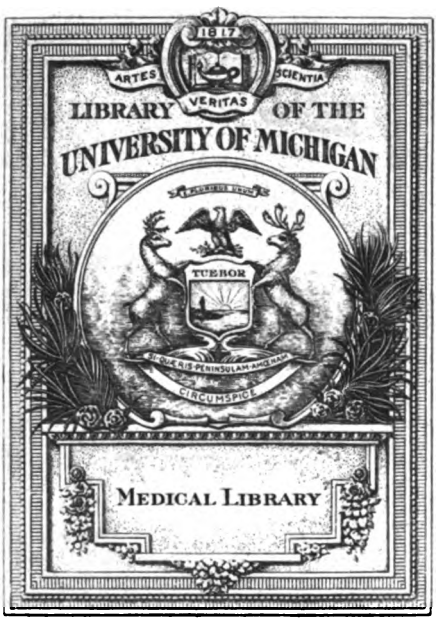

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TRANSACTIONS

OF THE

New York Academy of Medicine.

SUGGESTIONS IN THE TREATMENT OF SOME OF THE DISEASES OF WOMEN.*

By FREDERICK A. CASTLE, M.D.

ALTHOUGH my attention has not been devoted exclusively to the treatment of the diseases of females, circumstances have enabled me to become somewhat familiar with this class of affections. From the standpoint of the general practioner I have realized the importance of a thorough knowledge of the individual patient, and of properly estimating the extent to which derangements of other portions of the body, or inherent tendencies toward disease, may complicate affections peculiar to the sex. I cannot claim that the result of such study will enable me to present you with anything very novel or remarkably valuable. I shall merely attempt to bring to your notice several matters which, by themselves, might not justify extended consideration on such an occasion as this, but which, when taken together, may, I hope, be worthy of your attention.

Most physicians in general practice have frequent occasion to prescribe for women who, between the ages of

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*Abstract of a paper read before the N. Y. Academy of Med., March 2, 1882.

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forty and fifty years, suffer, for a period of two to four years from certain peculiar disturbances of the nervous system that coincide with the menopause. I believe that many physicians look upon these derangements as evidences merely of indigestion. Others—and very likely the majority—recognize their true character, but consider them to be, practically, unavoidable, and so inform their patients; saying, as a means of encouragement, that when the menopause is completely established these troubles will all disappear of themselves. This statement has so often been reiterated that most women accept this view of such troubles, and, as a matter of course, endure them without consulting a physician, resignedly hoping for the time when these annoyances will cease. Knowing, as we do, that most women suffer from these troubles, in some degree, during the climacteric, it is remarkable that so little reference is made to the subject by medical writers and especially by those who treat of diseases peculiar to females. Excepting Lawson Tait and Robert Barnes, no systematic writer on gynecology, so far as I am aware, refers to it. The best, and I may say almost the only account of the nervous phenomena most commonly met with in these cases, is to be found in the writings of Dr. Sidney Ringer, from whom I will quote, since no description that I could give would be so graphic.

"A woman, perhaps from the sudden arrest of perspiration or through depraved health, or nervous depression, or more frequently at the change of life, suffers from frequent attacks of flushings or 'heats,' starting from various parts, the face, epigastrium, etc., thence spreading over the greater part of the body. The face and even the backs of the hands are often deeply reddened, the veins of the hands dilating to double the previous size. Although the patient feels deeply flushed sometimes the skin remains natural. The sensation of heat may be so urgent that the patient opens her clothes or removes the greater part of the bed-clothing, and even throws open the windows in the coldest weather. These heats may last a few minutes only, or an hour or more, and may be repeated many times a day. They are generally followed by perspiration, often very profuse; at other times

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the skin remains dry. The attacks are then commonly termed "dry heats." The heats are often accompanied by throbbing throughout the whole body and followed by much prostration, the patient seeming scarcely able to rouse herself. After the heats pass away the skin sometimes becomes cold and clammy, and may turn very pale. The least exertion or excitement may bring on these heats, and such a patient generally complains of cold feet and sometimes of cold hands The flushings are occasionally peculiar and abruptly limited, reaching to the thighs, knees or elbows, and while all the parts above these feel burning hot, the parts below feel icy cold; sleep, too, is often much broken, the patient waking with frequent starts, and in the morning feeling unrefreshed. Sometimes they occur chiefly at night. In many cases palpitation or 'flutterings at the heart,' occur on the slightest excitement, or even without apparent cause."

For the treatment of these symptoms Mr. Tait says he "knows nothing better than the occasional use of a drastic purgative and removal from home at frequent intervals." He has seen immense relief from small bleedings, but does not recommend this as a remedy to be used indiscriminately.

Small bleedings and saline purgatives are the principal remedies also advised by Dr. Barnes, unless we include the pretty constant use of bromide of potassium.

Dr. Ringer extols the value of nitrite of amyl, and advises that it be dissolved in alcohol, two minims to the drachm, and of this, three to five drops to be taken on sugar every three hours, with an additional dose as soon as a flush begins.

I have not used the small bleedings nor the pugatives; the bromide I have tried, and I believe this is the remedy most commonly used by others. I have not found that my patients experienced much benefit from it unless it be taken continuously, and in doses which are liable to interfere with nutrition. The amyl nitrite I have given occasionally with some benefit, and I should probably have continued to use it had not my attention been directed, some four or five years ago, to the power of arsenic to control nearly, if not quite all, of the symptoms described by Dr. Ringer. Within

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that period I have seen a comparatively large number of cases presenting, individually, most of the symptoms just described, and in every case the continued use of arsenic has either relieved the patient entirely, or so far lessened the severity of the attacks as to quite satisfy her. The officinal solution of arsenite of potassium was the form of arsenic most frequently selected, three to eight drops being given three or four times daily.

I do not know who originated this mode of treatment, and besides our president (Dr. Barker) and two or three others I know of no one who employs arsenic or its compounds for this purpose. Neither do I find any writer who mentions it. I have, as I said before, used it in a large number of cases, and the result has been such that I desire no better remedy for the purpose. If others are equally fortunate we should be able to greatly relieve the sufferings of a large number of women, who certainly deserve, after years of child-bearing and the discomforts of the menstrual epoch, to enjoy the remainder of life in unbroken health.

It might well demand some hardihood on the part of a writer, at the present day, to venture upon the field of uterine displacements. So much has already been said and written, restated and rewritten already upon this much-vexed subject that some hesitation is quite natural in approaching it in the presence of such an audience. There are, however, certain things which have been forced upon my attention, in cases I have treated, which appear to me to be worthy of much more attention than they have received, even at the hands of specialists. No writer on gynecology, with whose works I am acquainted, has laid stress upon, or even mentioned the importance of over-distention of the abdomen with flatus as a cause or complication of uterine prolapsus; but it is quite uniformly mentioned as a consecutive, rather than an antecedent condition. Even in the admirable treatises best known to the physicians of this city, no mention is made of flatulence in this connection. If we waive, for the present, the influence of uterine ligaments and the retaining power of the vagina and perineal

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body, and look upon a prolapsus of the uterus as a hernia of the pelvic contents, it is not a difficult matter to comprehend that the same force which is capable of causing an intestinal hernia through the abdominal wall, when the latter is defective in power of resistance, may also produce an extrusion of the uterus through the pelvic outlet when its supports are feeble, or unable to maintain it in a normal position.

It is a notable fact that the period of life when either displacement—uterine or intestinal—most often occurs, is the same; and that it corresponds to that age when indigestion is most liable to become developed. For some time past I have been led to recognize the importance of this factor in the causation and the maintenance of uterine prolapsus; and I believe that the time will come when it will be more generally appreciated, and more care will be taken to prevent accumulation of flatus and consequent over-distention of the abdomen as a source of this more or less troublesome malady. In the treatment of prolapsus which has already occurred, it must also be thought to be nearly, if not quite as essential to diminish intra-abdominal tension, as to adapt a suitable mechanical intra-vaginal support.

It has never been clear in my mind that the mere weight of the uterus, a superabundance of vaginal tissue, relaxed abdominal walls, or weakness of the supporting ligaments, should be sufficient of themselves to produce so great a displacement of the womb as is often seen, and I can think of no initial or complicating cause so likely to exert as great an influence in this way or so commonly present in nearly every case we are called upon to treat, as the one here referred to; and while I do not doubt the importance of a rupture of the perineal body as a causative factor in many cases, I have seen more than one case of complete protrusion of the uterus in women who had never borne children and where the perineum had never been lacerated; in these cases, however, dyspepsia had long been an ever-present condition. My practice for some time past, has been, in these cases, to restore if possible the power of digestion, and prevent fer-

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mentation of food and accumulation of gas in the intestine, at the same time that I have made use of mechanical support of the uterus. I have found, as a consequence, that the latter method of treatment has been greatly simplified, since smaller and less troublesome pessaries are required, and those used are less liable to displacement.

In this connection I wish to say something about a class of cases attended with almost constant discomfort to the patient and which often tax the resources of a skillful specialist, viz., those in which a retroverted uterus becomes attached by inflammatory adhesions to the anterior wall of the rectum. In some of these cases the interference with the function of the bowel is very considerable, and some of the symptoms resemble those of stricture of the rectum. It has been my fortune to have a few cases of this nature, and in some of them I have noticed a symptom which is not usually mentioned; that is hemorrhage, not due to piles, but coming from a limited space on the anterior wall of the bowel at the point where pressure is exerted by the displaced uterus.

My attention was first attracted to this complication in a case which appears to have been caused by excessive exertion in running, and in which a physician of respectable reputation made a diagnosis of "biliousness." A pelvic peritonitis followed and attached the uterus to the bowel before the condition was recognized, and from this time constipation became habitual; hard fæces accumulated behind the stricture, and soft fæces were extruded in ribbon-shaped masses. After a couple of years blood was passed at irregular intervals, but usually corresponding to the act of defæcation. At other times the sensation characteristic of the recurrence of the bleeding would be felt and a considerable amount of blood would be voided shortly, but unaccompanied with fæces. A careful examination of the rectum in a good light, with the aid of a speculum and laryngeal mirror, discovered no hemorrhoids, but at the point on the mucous membrane opposite to the adhesion was an abraded surface from which the blood had apparently escaped. I had al-

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ready instructed the patient in the method of replacing the uterus by atmospheric pressure exerted through the dilated vagina, but it had afforded no relief from the symptoms of the displacement, and I now tried a modification of Dr. Campbell's method, which to me was novel, and which was followed by such good results in this as well as in other cases since treated, that I recommend it to those who meet with a similar experience. Besides the position on the knees and chest and the use of a tube to admit air into the vagina, the rectum was also dilated by a similar manœuver, a syringe nozzle being employed to admit air through the anus. This procedure permits the anterior wall of the bowel to fall forward, and the uterus to assume a more natural position. The patient should then assume the position adopted in using a Sims' speculum; and although some of the air will escape, enough will ordinarily remain to support the uterus for a time in a better position, and relieve the bowel from pressure. The results of the pressure will in a measure subside, and the function of the bowel can be performed with less discomfort and more completely. I have no idea that a case of adherent retroversion can be cured by this means, but some of its most distressing features can certainly be obviated. In the case referred to, it put a stop to the hemorrhages at once, and they have not since recurred after the lapse of two years. Moreover, persistence in the use of this measure has enabled the patient to ride and walk with comparative comfort, and she dances without suffering materially.

* * * * * * *

A reason has occurred to me why, in the treatment of uterine displacements, pessaries with somewhat straight lateral bars cause less discomfort usually, and support the uterus more satisfactorily than others which create greater displacement of the vaginal tissues from their natural position. It is this; the Figure 1, (copied from Hencke) shows that a section of the vagina behind the sphincter presents the appearance of a broad letter ⊢⊣, the transverse fissure terminating in longitudinal antero-posterior folds. When the

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vagina is distended sidewise the transverse fissure is lengthened at the expense of these short folds. In adapting a pessary of the Hodge, Emmet, or Albert Smith varieties I have usually endeavored to adjust its width so that its lateral bars will occupy these short folds, as shown in Figure 2. This causes the least possible displacement of the vaginal walls and adjoining structures, and the grasp of these folds upon the pessary is of service in retaining the instrument in place. The effect of using a pessary so broad as to oblit-

FIG. 2.

FIG. 1.

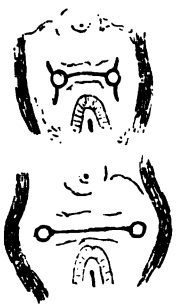

FIG. 3.

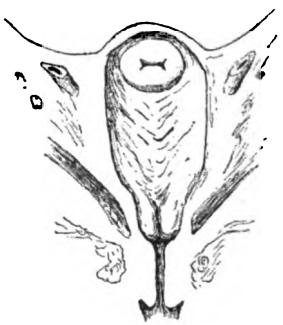

FIG. 4.

erate the vaginal folds is shown in Figure 3, where the levator ani muscles are also represented as having been pushed aside from their natural course.

In describing his modification of the Albert Smith pessary Dr. Thomas does not refer to this relation between the instrument and these folds of vaginal tissues, but attributes the retaining power of the pessary to "the length and degree of post-uterine curve and by the retention established by the tissues under the pubis against the downward-curved lower extremity." I believe that the relation of the parts above mentioned will also help to explain why this instrument is generally so well borne.

The retaining power of the tissues below the pubis, refered to by Dr. Thomas, is well shown in Figure 4, also from Hencke, in which the vagina and uterus are represented as seen from below and from behind; the lower vaginal

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wall having been removed. The narrowing of the outlet of the vagina, first by the adjacent levator ani muscles and next by the sphincter, is very apparent. A knowledge of this arrangement of the parts should prevent the use of a pessary with a broad lower extremity, like some of the older "Hodge" patterns, unless the intention is to make the levator ani muscles the points of resistance against an expelling force.

The mode of using a vaginal douche is another subject worthy of more attention than it generally receives. First as regards the form of syringe nozzle. Others have repeatedly called attention to the risk of injecting the cavity of the uterus when a nozzle having an aperture in the extremity is used; but since the syringe-nozzles now made are, with few exceptions, so constructed, it may be well to suggest that, with the aid of a pocket-knife and an ordinary match the objectionable opening may be securely plugged. It is quite possible, also, for a stream to be thrown into the uterine cavity from whichever one of the side openings may happen to come opposite to the os uteri, and to prevent this I have also plugged one of the side openings and then given the tube a curve with the concavity on the side corresponding to the plugged hole. In using the nozzle the patient will naturally introduce it with the concavity upward and no accident can then occur.

Next, as regards the material of the injection itself and the mode of employing it. All writers on gynecology say that the douche must be used in the recumbent posture; they then proceed to remark that it involves some trouble to do it properly, and that it generally demands the presence of a nurse or an assistant. These reasons are usually sufficient to cause the whole procedure to be regarded as a nuisance, and the patient, instead of taking her douche in the way directed, sits on some vessel which receives the escaping fluid. Several ingenious but more or less expensive and troublesome contrivances have been proposed, but their use is by no means general, and vaginal douches are, for the most part, used in a way that is productive of little or no good. As a compromise I have long since adopted the

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plan of directing patients to make use of a comfortable hip-tub ; a comparatively inexpensive affair, which will also serve other purposes. The water of the bath being used for the douche as well, the effect will usually prove more satisfactory than that which follows the douche as it is generally managed. The difference in the amount of trouble is so much in favor of the plan here proposed that I rarely find it to meet with opposition; on the contrary most patients enjoy it. The revulsive effects of the hot hip bath alone upon the pelvic and abdominal viscera is in itself of great service in relieving congestion, quieting pain, and producing sleep.

Respecting the nature of the injected fluid, it may be said that the value of prolonged hot injections in reducing inflammation and in removing its products is too well recognized to warrant any present comment. I doubt very much, however, whether medicated injections are of any practical value, in view of the fact that absorption of medicinal substances by the vagina is very limited at most ; I have found, moreover, that there is a better way for lessening engorgement of the vaginal mucous membrane than by the action of tannin and certain other astringents; that is, by the addition to the hot water of the douche of sufficient salt, or some other indifferent substance, to give the water a greater specific gravity than the blood plasm. This causes an osmosis towards the salt solution, which rapidly empties over-distended capillaries, and is practically just what we accomplish when we insert tampons filled with glycerin.

In presenting the foregoing notes I recognize the fact that they do not correspond to the character of the papers usually read before the Academy. As some justification, however, I take the liberty of quoting a remark of Dr. Emmet's, that "success in the treatment of diseases of women lies wholly in attention to minute details."

The results of excessive abdominal distention and the nervous disturbances of the menopause are by no means so grave affections as lacerations of uterine and perineal tissues, but they are vastly more common, and in the aggregate cause much more suffering. Their relations to gyne-

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cology seem to have been largely overlooked by the specialist, probably because they have been considered to belong to the domain of general practice; and, on the other hand, the writer on general medicine has recognized their connection with derangements peculiar to females and has left their discussion to the specialist. I hope, therefore, that the time spent in their consideration here will not have been wasted.

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GROWTHS IN THE NASAL PASSAGES.*

BY F. H. BOSWORTH, M.D.,

PROFESSOR OF DISEASES OF THE THROAT IN THE BELLEVUE HOSPITAL MEDICAL COLLEGE, NEW YORK.

IT is not my intention this evening to go over the whole subject of neoplasms in the nasal passages, but simply to ask your attention to some of the commoner forms of growths, met with in every day practice, and to bring before you some suggestions in the way of treatment. By the nasal passages, it should be understood, is meant the whole of the nasal air-tract, extending from the nostrils in front to the border of the soft palate posteriorly. This tract being from a physiological point of view a single channel for the passage of the inspired air, whatever the anatomical boundaries may be. By far the most common of all growths occurring in this tract is the so-called

ADENOID OF THE VAULT OF THE PHARYNX.

I think it is a somewhat general impression that this affection is a rare and obscure one, and moreover, that it gives rise to a train of symptoms peculiar to itself. The point of view to which I ask your attention to-night is rather that the disease is an exceedingly common one, and that it is one of the various, and perhaps the most frequent of the morbid conditions which give rise to an abnormal discharge from the nose, and hence is obscured and lost sight of under

* Read before the New York Academy of Medicine, January 4, 1883.

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that very vague and indefinite term "nasal catarrh." Nasal catarrh is an exceedingly meaningless term. In former years, when our means of diagnosis were imperfect, and our methods of exploring the nasal passages were very crude, it is not to be wondered at that all diseases which give rise to a discharge from the nasal cavities were grouped under this general designation. Of late years our means of diagnosis have been so far perfected that it is possible in every case, unless possibly in very young infants, to bring under ocular inspection the whole of the lining membrane of the upper air-passages from the nostril to the trachea. I say every case, and I think the assertion a perfectly safe one, for even the most irritable throat, by the exercise of a little patience and deftness, will easily be so far brought under control as to admit of a satisfactory rhinoscopic examination. This thorough examination, then, will reveal to us, in a very large majority of cases, some definite morbid condition, to account for the "catarrh," the removal of which will be followed by a radical cure of the disease. Among the common conditions which may cause a catarrhal discharge may be mentioned rhinitis hypertrophica, rhinitis atrophica, nasal polypus, deviated septum, syphilitic ulceration or necrosis, strumous ulceration, the presence of foreign bodies, adenoid of the pharynx, etc.

Chronic catarrhal inflammation of the mucous membrane lining the nasal passages develops in two varieties, the hypertrophic and the atrophic form. Hypertrophy, involving the mucous membrane of the nasal cavities proper, has been well designated rhinitis hypertrophica. The same hypertrophic process developing in the vault of the pharynx has been called adenoid of the pharynx. Nature has been very lavish in her endowment of the upper air-passages with numerous glands and follicles, whose function is to pour out upon the mucous membrane an abundant mucus, by which it is kept in a soft, moist, and pliable condition, otherwise, the constant passing to and fro of the inspired air, often dry and irritating, would tend to rob it of its moisture and cause a dryness by which its proper functions would be seriously impaired.

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These glands and follicles manifest a tendency to aggregate themselves together in various localities. The most notable instance of this is between the pillars of the fauces, constituting what is called the faucial tonsils. Quite a large group of glands is found at the pharyngeal vault. Wherever we find these masses of glands, we find them manifesting a tendency to become the seat of chronic inflammatory changes. These changes in the pharyngeal vault always result in hypertrophy. I have never met with a case of atrophy. A description of the normal glandular structures which exist in this region need not be entered upon. They were first fully described by Luschka, and hence the mass is often spoken of as Luschka's tonsil. The condition to which I invite your attention consists in the development in this region of more or less well marked, distinctly outlined growths, which vary from the size of a coffee grain to that of a large chestnut, or even larger. Loewenberg and Meyer describe these as consisting of adenoid of true glandular tissue, while Woakes considers them to possess certain features of the papillomata, and gives them the name of *adeno-papilloma.* In this view I believe he is quite alone. Their true nature is, undoubtedly, adenoid. They consist in a true hypertrophy of the normal glandular structures which are found in this region.

The following description has been furnished me by Dr. Heitzmann, of this city, who has very kindly made microscopic examinations of a number of these tumors which I removed.

Microscopical examination of the pharyngeal tonsil.—Five growths of the pharyngeal tumor were handed to Dr. Heitzmann, by myself. He examined them after they were hardened in chromic acid and embedded in a mixture of paraffin and wax.

On transverse section a number of features are observed, common to all the five growths. These are:

First, they are covered by a layer of columnar ciliated epithelia which exhibits the features of stratified columnar epithelium. The single columnar epithelia greatly vary in height, and exhibit sometimes long, sometimes short, bent

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ciliæ. Between the elongated feet of the epithelia irregular corpuscles of varying shape are visible, such as occur throughout the mucous layer of the aërial passages, the larynx, the trachea, and the bronchi. Only in one specimen was one side of the tumor covered by a narrow layer of stratified epithelia, probably corresponding to the medial aspect of the tumor, without cilia, with a gradual transition into columnar epithelia.

Second, all the tumors exhibit a lobate appearance, the fissure between the lobes being sometimes shallow and at other times very deep, dividing the whole mass into a number of longitudinal ridges. Each ridge may again exhibit a varying number of shallow papillary protrusions. Under the microscope correspondingly we observe large protrusions which are caused by the follicular formation of the tissue, and small ridges of a papillary aspect caused by narrow protrusions of the subjacent tissue.

Third, the main mass of the tumors is composed of lymph tissue, formerly termed adenoid tissue, from the mistaken idea that this tissue is glandular in nature. No epithelial formations enter, however, the structure of the tumor, save the depressions and furrows between the lobes, sometimes penetrating very deeply into the mass of the tissue, and there producing manifold secondary convolutions. Beneath the epithelial cover there is no fibrous connective tissue around the lobes, while the papillary elevations are produced by a delicate fibrous connective tissue freely supplied with lymph corpuscles.

According to the general structure of lymph follicles and lymph ganglia, we find in the tumors under consideration a varying number of lymph follicles, consisting of an accumulation of lymph corpuscles, and supplied with a comparatively small number of blood-vessels. The follicles are separated from each other and enclosed by what is known as interfollicular strings. In these both a myxomatous reticulum and the fibrous variety of the connective tissue is more developed than in the follicles, and the blood-vessels are somewhat more numerous. Only in one of the specimens was there a

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marked fibrous interfollicular tissue with comparatively few lymph corpuscles. In all others the fibrous connective-tissue was but little developed, which feature would account for the comparative softness of these new formations.

With high power of the microscope in all specimens the features common to lymph tissue are discernible. There is a myxomatous reticulum ill-defined and crowded with lymph corpuscles in the meshes within the follicles. There is a more developed myxomatous or fibrous reticulum with comparatively less lymph corpuscles in its meshes within the interfollicular strings.

In one case a cyst was observed in the tissue near the surface, just perceptible to the naked eye, the size of a small pin's head. This cyst is lined on one side by flattened epithelia, on which even ciliæ are still recognizable, while the opposite side lacks an epithelial cover, but is composed of lymph corpuscles in connection with a delicate myxomatous tissue, filling in part the cyst. This latter feature indicates that the cyst has not arisen simply from an obstruction of an interlobular fissure, but is due to a transformation of the epithelial cover, at least on one side, into a medullary, and from this into a myxomatous tissue.

The examination proves the formations under consideration are no tumors, in the proper sense of the word, but a hyperplasia of the lymph tissue, which constitutes the so-called pharyngeal tonsil. A difference between hyperplastic faucial tonsils and pharyngeal tonsils is that in the former the fibrous connective tissue is, as a rule, far more developed than in the latter.

This explains the fact I have noticed in operating with the snare, that the faucial tonsil is cut with the extremest difficulty, while the latter are severed with the greatest ease, offering but trifling resistance to the wire.

As a matter of course, formations of a simple hyperplastic nature are benign. This is in accordance with the clinical fact that their extirpation, in the great majority of cases, is not followed by recurrence. The lymph tissue is, however, the sample of a malignant type of tumor proper, the

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so-called lympho-sarcoma, or lympho-myeloma. Should, by a continuous growth, the lymph tissue keep increasing, no doubt it will establish a malignant tumor, such as has been observed by several writers in this region.

During the past eighteen months I have met with 75 cases of adenoid disease of the pharyngeal vault. Of these there were:

Under the age of 10	5
Between the ages of 10 and 15	16
" " 15 " 20	27
" " 20 " 30	23
" " 30 " 40	2
" " 40 " 50	1
Above the age of 50	1

Of these 49 were females and 26 males. We thus see that the larger number occur about the age of puberty, it being very rare in small children, and also in adults beyond the age of thirty. The deduction from this is quite obvious, viz.: that the growths gradually shrink and disappear with the development which sets in at puberty. We thus find a very striking analogy between this affection and hypertrophy of the faucial tonsil, not only as regards its normal histology and pathology, but also in its development and clinical aspects.

In a large proportion of the cases which I have seen it occurs as a separate and independent affection, less than one-half showing any morbid condition in other portions of the nasal passages. The most frequent condition with which it is associated is rhinitis hypertrophica or chronic inflammation of the mucous membrane lining the nasal cavities proper. In ten cases it was associated with enlargement of the faucial tonsils. In four cases it was met with in connection with rhinitis atrophica or dry catarrh, three of these having reached the stage of ozæna. The cause of these growths lies simply in the tendency toward hypertrophy as the result of inflammatory changes which characterizes the lining membrane of the upper air tract and its appendages, under the stimulus

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of repeated colds. I do not believe it ever to be a manifestation of a systemic dyscrasia, but rather that it is purely a local disorder. It occurs in children more frequently than in adults, for the same reason, that all glandular structures in childhood are more prone to take on morbid changes.

This *diagnosis* is usually quite easy. Meyer and Loewenberg both insist on a digital exploration in addition to the use of the rhinoscopic mirror. This I have often done, but have never found it absolutely essential. The introduction of a finger, forcibly as it needs must be, behind the palate of a child very naturally excites pain, often retching, and always terror and apprehension, and it seems to me much better to retain the confidence of the child by resorting to simpler measures when all that can be desired is accomplished by such. In all cases, even in children of seven or eight years of age, with the exercise of a little patience, I have succeeded in obtaining a thorough inspection of the pharyngeal vault, by this means gaining, I think, a fairer estimate of the size, shape, and location of the growth than can be gained by digital exploration. I should say, however, that as a rule, it is important to make use of sunlight or the calcium light in making the examination, as the ordinary gas-jet is not sufficient to thoroughly illuminate the cavity of the pharynx, especially if a small mirror is used.

Symptoms.—The prominent and most troublesome symptom to which the presence of these growths gives rise is an excessive discharge of mucus or muco-pus; indeed, nearly all the cases which have come under my care have come for nasal catarrh. The source of the discharge is, undoubtedly, in the hypertrophied glands themselves, their normal secretory function not being destroyed by the morbid process, which has given rise to the hypertrophy, but is, on the contrary, greatly increased. We find them, therefore, pouring out large quantities of mucus or muco-pus, which in the larger proportion of cases makes its way into the lower pharynx. In those cases in which the growth has attained a large size, the discharge makes its way through the nasal cavities proper, and is voided through the nostrils.

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Voice.—Another symptom which may be traced directly to the existence of these growths, and perhaps the first to be noticed, will be the altered character of the voice. This is changed into what Meyer calls the dead voice. It is the voice of one with a cold in the head, that is the nasal twang is more or less completely abolished. In this way "m" and "n" become "eb" and "ed." In order to give rise to this, the growth need not be large. It may occlude but a small portion of the posterior nares. If you will glance at the diagram, you will see that in order that the voice shall have its full nasal resonance, the vault of the pharynx should be quite clear. If but a small growth projects from its wall it seriously interferes with the sound-waves, which in nasal sounds should have a clear field from the vocal cord to the roof of the nares. If they impinge upon the slight projecting shoulder of a growth located in the pharyngeal vault they are to an extent smothered, and the whole tone of the voice deadened.

The manner in which the singing voice is affected by these growths in the pharyngeal vault offers many points of great interest. Nature is very lavish in her endowment of the various organs of the body by which their different functions are performed, and so supplies an organ capable of doing vastly more work than it is usually called upon to perform. The larynx when called upon for an ordinary voice responds readily, and will supply apparently a clear, healthy, conversational voice for years, even when there may exist very marked morbid change. Let the voice be taxed by a prolonged and labored effort, as in a sermon or address, and the weakness soon makes itself felt. I have little doubt that many in this room to-night, who are not called upon to make any especial use of the voice, and who are conscious of no noticeable weakness, were they called upon to take pastoral charge of one of our city pulpits, would at the end of the season find it necessary to seek a six months' vacation in Europe at the hands of their congregation for a clergyman's sore throat. The singing voice taxes the very highest powers and capabilities of the larynx, and demands not only

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a healthy larynx, but a healthy condition of the whole upper air-tract. The recognition of this latter truth I believe to be of the utmost importance. The vocal waves are set in motion by the vibration of the vocal cords, the pitch of the tone is regulated by the tension of the cords, and here in the main, the function of the larynx ceases, unless we add perhaps quantity or loudness of voice. These qualities of the voice which we call timbre, its character and resonance, are given it by the pharyngeal and nasal cavities. These should be entirely clear of any obstructing morbid condition or changes in their lining.

In the lower or chest register, so called, the nasal and pharyngeal cavities are of comparatively little importance. The voice depends largely on the larynx. In the middle register a healthy pharynx is of importance, but in the head register a healthy nasal and pharyngeal cavity are absolutely essential. The manner in which the singing voice soon breaks down under the action of a pharyngeal growth is quite simple. As soon as a note in the upper register is attempted, the singer is conscious of something wanting, the tone is muffled, from the fact that the vocal waves striking upon the mass are suppressed as it were, the sounding-board function of the pharynx is destroyed. The singer, therefore, in order to overcome this obstacle, attempts, though generally without success, to increase the power or volume of the voice. The larynx is taxed beyond its strength, and rupturnd capillaries or ruptured muscular fibres result, and a chronic laryngitis is the consequence. It is much as if the rector of Grace Church should attempt to make himself heard by a church full of people with a feather mattress fastened into the sounding-board over his pulpit.

It is a very noticeable fact with singers that it is the head register which becomes first impaired in a failing voice, and in many cases it is the head register alone which is weak, the middle and chest notes being taken with ease and in clear voice. This illustrates the truth of what I have for a long time urged in my teaching. The nasal passages are the first to become the seat of catarrhal disease, and the tendency is

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very marked for this to extend downward, and furthermore, that in the very large majority of instances, so-called chronic laryngitis is but a secondary condition, resulting from disease in the nasal cavities, the laryngitis being a symptom, as it were, of the disease in the parts above.

The effect of the growths on the sense of hearing has been long recognized. In eight of the cases which I have seen, the impairment of hearing was quite marked. In a larger number of others the impaired hearing was not complained of, but was determined by the ordinary watch test, twenty of the cases presenting ear symptoms. In two of the cases there had been severe attacks of otitis media, while in six there had been complaint of frequent attacks of earache.

I scarcely feel justified in saying much of this feature of the disease, from a lack of familiarity with ear diseases, yet in making a very large number of rhinoscopic examinations I have necessarily inspected the Eustachian orifices and observed the functions and muscular movements of that region.

Impaired hearing from the presence of adenoid growths in the pharyngeal vault has been attributed to pressure on the Eustachian orifice. These growths are of a soft, pulpy consistency, while the eminences which surround the Eustachian orifice are hard and dense; hence, any pressure exerted upon them by an adenoid growth would have but slight, if any affect. I think a far more plausible explanation of the symptoms is in the interference with renewal of air in the middle chamber caused by their presence in the pharynx. Any cause which interferes with free nasal respiration, if continued sufficiently long, is liable to cause impaired hearing, by its interference with this function. The method in which this occurs, I take it, is that nasal stenosis, arresting the to-and-fro current through the nasal passages, causes a stagnation in the pharyngeal vault, and necessarily a certain amount of rarefaction of air in that region. Moreover, the free action the levator palati muscles is interfered with by the presence of these growths, and this

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movement is of the utmost importance in accomplishing this mechanism of air renewal. In studying these parts by the rhinoscope, the impression is gained that the tendency of muscular movement here is to force air into the middle ear. The constant and almost ceaseless impulse of sound-waves upon the tympanum must necessarily cause a rarefication of air in the middle ear, and this loss is compensated for by the mechanism above alluded to.

That the ear symptoms are due to an extension of catarrhal inflammation to the Eustachian tube, I think is very questionable. I am disposed to think this is an extremely rare occurrence. Certainly it is very rare to find the lining membrane of the Eustachian orifice in a condition of catarrhal inflammation. In one case which has been under treatment, there was very distressing tinnitus aurium. In this case the adenoid pressed upon the Eustachian orifice; the symptom was very markedly relieved by the removal of the growth, though not entirely removed. In this case there was no impairment of hearing.

Nasal stenosis is quite a prominent symptom of this affection, and is present in cases where the growth has not attained an unusual size. This may not be so noticeable during waking hours, but during sleep, when the voluntary muscles of respiration are not brought into play, it is more prominent, and the patient sleeps with mouth open. The vicious effect of this I need not enter upon at full. Habitual mouth-breathing, especially during sleep, I believe to be a most prolific source of throat catarrh, and liability to bronchial disorders.

It is a very noticeable fact that these growths show noticeable change in size when examined at different periods, which would indicate simply that under the influence of damp weather or other causes, they are liable to become the seat of an active turgescence or distention of their blood-vessels, by which their size is temporarily increased.

This occurrence, especially in children, is attended with an increase of secretion, with obstruction to nasal breathing.

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Cough is present in certain cases, especially if there is much secretion, which has made its way down the pharynx into the larynx, exciting a laryngitis. The cough, again, may be the result of the habitual mouth-breathing.

In one case which came under my care about a month ago, a young lady of twenty, the only symptom was a persistent hoarse, dry, barky cough. The only morbid condition discoverable in lung or air-passages was a small adenoid. This I removed, with almost immediate relief, and since then the cough has gradually disappeared.

In this case the cough was undoubtedly of a reflex origin, something in the nature of the ear-cough which we occasionally meet with, due to an accumulation of cerumen in the outer ear, or some other aural irritation.

Treatment.—This consists in their total extirpation. The only question that arises is as to the best method of its accomplishment. Chemical agents, chromic acid especially, have been recommended by several writers on the subject. I have tried this method and find it to be utterly unsatisfactory. The cutting forceps, as recommended by Cohen, of Philadelphia, Woakes, of London, and others, I have never used, but it always seemed to me a somewhat formidable instrument, difficult of nice manipulation, and moreover harsh and painful. The curette recommended by Mackenzie I formerly used with considerable satisfaction, but it did not seem adapted for use with the larger growths.

Meyer, of Copenhagen, Michael and Hartmann, of Berlin, recommend the use of cutting instruments introduced through the nares and manipulated by means of the finger passed behind the palate. Meyer's instrument consists of a stout ring with an inner cutting edge, the whole mounted on a stout rod. The other instruments mentioned are of a similar construction. Meyer furthermore advises, after the removal of the growth, that the remaining fragments be separated by a curved instrument with a rasp surface, which is passed around the palate and the base of the growth rasped as it were. Finally he advises the cauterization of the denuded surface. These procedures I can only refer to without com-

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ment other than that they seem somewhat unnecessarily severe. I have never made use of them.

Voltolini, of Breslau, Michel, of Cologne, and Loewenberg, of Paris, give preference to the galvano-cautery. There are two methods in which this may be used—first, the removal by the burning through the base with a heated wire, and second, the destruction of the growth by means of an incandescent button-electrode.

The first method I do not regard as feasible, although Michel claims success in it.

As regards the absolute destruction of these growths, or in fact any morbid growths of any size by the galvano cautery, I have only this to say: It is an immensely overstimated instrument, and, in my experience, has utterly failed to accomplish what we formerly anticipated from it.

If we apply a cold electrode to a tumor and then close the circuit, the loss of heat is so great that, as a rule, a more than very dull heat is not obtained, the result is but a very superficial charring of the mass. In the vault of the pharynx this procedure only is applicable, as a rule, for it would require very nice manipulation to pass a heated electrode to the point desired without touching healthy portions of the passages. Still, if this were done, and an electrode were used in which the heat were developed before entering, there is yet but a very superficial destruction accomplished, and the ablation of even a small tumor by this means becomes a tedious process, occupying weeks and months, requiring an interval between each application for the exfoliation of the slough, and this may be attended by the unpleasant accompaniment of an offensive discharge. Moreover, I believe we should always recognize the fact that the application of the galvano-cautery is attended oftentimes with a very severe reaction, setting up renewed inflammatory processes, by which the tumor may be stimulated to new development, and a part at least of what has been accomplished may be counterbalanced by the renewed process of growth.

There remains only to describe a very simple method, which I have practiced exclusively in the last year, and which,

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it seems to me, possesses marked advantages over any other device. This consists in the use of a modification of Jarvis' snare écraseur, which I show (Fig. 1). As will be seen, I have had constructed an ordinary snare with a distal tube of six inches length; the end of this is curved in a quadrant of a circle whose radius is one and one-fourth inch. This is now mounted with a No. 5 piano-wire, which I regard as by far the most useful number, as combining elasticity, strength, and resistance. Having observed the growth and carefully estimated its size, a loop is formed which will embrace it, and is then bent forward over the end of the instrument, in order to give it a decided kink. The wire is now played out of the snare about an eighth of an inch, and the whole loop is now thrown backward toward the handle of the instrument, giving it another bend. As will be seen, it is in a position for easy introduction behind the palate, without touching the part, and may be passed immediately to the base of the growth. The palate of course is now immediately retracted by reflex irritation, but only embraces the tube of the snare, without in any degree hampering the manipulation.

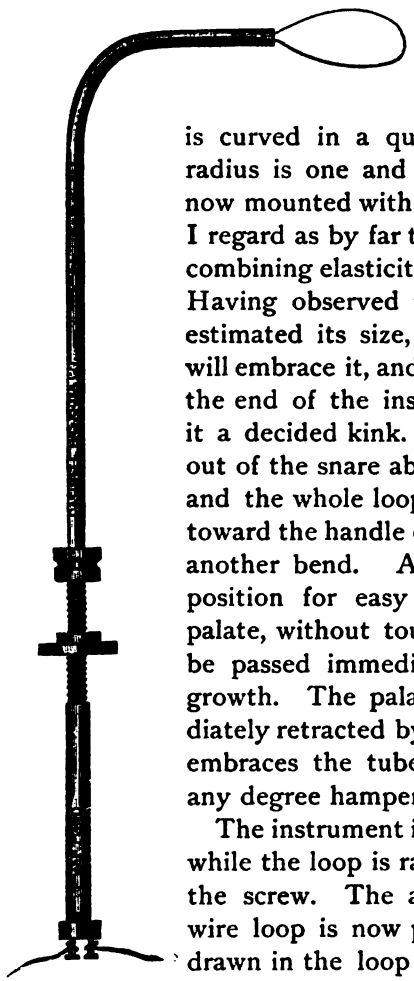

FIG. 1.

The instrument is now held firmly in place, while the loop is rapidly drawn in by turning the screw. The action of the bends in the wire loop is now perceived. As the wire is drawn in the loop is thrown backward with considerable vigor, and embraces and severs the growth. In this manner even a broadly sessile growth is easily seized and extirpated. There is but trivial hemorrhage, but little pain or retching, and the whole manipulation is accomplished very easily, simply,

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and speedily. After the withdrawal of the instrument, the tumor is expelled through the nose by blowing. Occasionally it drops into the pharynx below, but this is very rare. In no case has any patient experienced the slightest annoyance from the growth dropping too far down in the air-passage, nor do I regard this as an accident that is liable to happen. The operation by this method has never required an anæsthetic.

In three cases of children, in whom the control of the faucial movements prevented the manipulation, I was compelled to give an anæsthetic and resort to another method, which may be described in a few words. In these cases the growth was severed by passing an ordinary straight snare through the nose. Having mounted the snare with the wire, the loop was bent sharply down over the end of the instrument, giving it a kink, and then drawn within the tube until a loop only remained sufficiently small to pass through the nares; this was passed vertically until the loop was in the pharynx, when the instrument was turned, bringing the loop into a horizontal position, with the side undermost toward which the larger loop had been bent. The wire was now played into the pharynx, when the bend which had already been given it threw the loop downward, nearly to a right angle. The whole instrument was now pressed firmly against the pharynx, which, as will be seen, threw the loop over the growth. Holding the instrument firmly pressed against the pharynx, the screw was rapidly turned and the growth severed. As soon as the instrument was withdrawn the child's head was drawn over the table with the face downward, and the trifling hemorrhage allowed to go on until the child could be aroused, when the tumor was expelled by blowing the nose.

In this manner, as a rule, the whole growth may be removed, but in the first-described manipulation portions may be left. This is easily ascertained by examination as well as their location, and the manipulation repeated. This may be done a number of times at one sitting, entailing but little annoyance or weariness to the patient. As regards recur-

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rence, I have never in any of my cases seen any such tendency. Perhaps it is too early to hazard an opinion, but certainly I think it safe to assume that the method of operating described, if thoroughly done, leaves a far less liability to recurrence than the use of forceps, caustics, or the galvano-cautery. The inflammatory reaction after these methods is certainly very notable. In the use of the snare, whether in adenoid or other growths, I have never in any single case noticed the slightest reaction occur, with the sole exception of some few cases where I removed tonsils by it.

This question of reaction after removal of growths I regard as one of exceeding importance, and desire to lay especial stress on the fact of its absence after operations by the snare.

The next variety of growth in the nasal passages to which I will call your attention is

NASAL POLYPI.

Nasal polypus means properly a tumor of the nasal cavity attached to the parts beneath by a narrow pedicle. As a matter of clinical observation, the only pedunculated tumor with which we meet in this region is the myxoma. A more exact classification would demand that to each variety of growth the name should be given which describes its pathological character. In this way we would do away with that very careless classification which describes nasal polypi as well as naso-pharyngeal polypi. I have never met with a case of polypus in the naso-pharynx; the growth which is described under this heading being usually a fibroma, which is always a sessile tumor.

Nasal polypus has been recognized since the days of Hippocrates, and consists in the development in the nasal cavities of soft, rounded, jelly-like tumors, resembling as much as anything the pulp of a grape. They generally occur in both cavities, though occasionally are found in but one. When they are confined to one cavity, it is my observation that they have been present but a short time and are few

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in number. From this I would infer that they commence in one cavity, and that their presence there very soon leads to their development in the other.

A single polypus is a very great rarity, as they seem to develop in clusters.

During the past year there were treated at my clinic for diseases of the throat 1,641 cases, of which 19 were cases of nasal polypus. During the same time I saw and operated upon 16 cases in my private practice.

Of these 35 cases there were two under 20—11 and 15 years.

Between	the	ages	of	20	and	30. . . .	9 cases.
"	"			30	"	40. . . .	2 "
"	"			40	"	50. . . .	12 "
"	"			50	"	60. . . .	6 "
"	"			60	"	70. . . .	4 "

Twenty were males and fifteen females.

It is essentially a disease of adult life, and occurs more frequently among males than females.

There were two cases under the age of 20, viz.: 11 and 15 years, respectively. These cases were of interest, as showing a somewhat immature development of the tumor. The individual tumor had not developed, but the growth shows, as it were, a cluster of seeds, a small central mass, about which are gathered a large number of small bead-like excrescences.

The peculiar shape of nasal polypi is probably due to their soft consistency. Under the influence of gravity, and perhaps the traction of the to-and-fro movement of the respired air, they are drawn out, as it were, from their attachment, and assume the pear shape which is peculiar to them. They rarely develop to a large size in the nasal cavity, simply because they have no room to grow. Occasionally they spring from the posterior portion of the cavity, and dropping into the pharynx, where they have abundant room for growth, they develop to a very large size, as is seen in the two specimens I show you, nearly the size of a hen's egg. These

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are operated upon through the nares, but of course removed through the mouth. Their source is usually the middle turbinated bones, but occasionally they are attached to the lower. In only two instances have I ever found a nasal polypus attached to the septum. The attachment is not on the convexity of the turbinated bones, but is in the recess between the under surface of the turbinates and the outer wall of the cavity.

As to the cause of nasal polypus, I know of none. It is a disease of the nasal mucous membrane peculiar to itself. There is certainly no relation between it and any of the constitutional dyscrasiæ. It is a purely local disease. It is very commonly taught that it is one of the results of chronic rhinitis. It very frequently occurs in connection with rhinitis, but quite as frequently, I think, independently of it. In three cases which I have seen it occurred in connection with atrophic rhinitis, which would certainly argue that it bore no especial relation to the commoner form of rhinitis, the hypertrophic variety.

In a number of instances I have removed single nasal polypi from the border of syphilitic ulcers in the nose, but the cause of the polypi here was not in the constitutional condition, but undoubtedly in the local morbid process.

Symptoms.—As regards the symptoms of nasal polypus, they are familiar to all, and demand no lengthy notice. The prominent symptom, of course, is the blocking up of the nasal passages, together with the profuse watery discharge. Their hygroscopic character, by which they swell up and pour out an increased quantity of watery serum under the influence of damp weather, is well known.

Prolonged, and oftentimes distressing attacks of sneezing is a symptom, the prominence of which is not generally recognized. The irritability of the nasal mucous membrane in chronic rhinitis is usually much diminished, I think, and sneezing does not occur in this affection. The presence of nasal polypi, however, gives rise to these attacks of sneezing in nearly all cases. This is especially prominent in the early stage of the development of these growths, and hence the

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occurrence of this should always excite suspicion as pointing to this affection.

The occurrence of spasmodic asthma as a reflex symptom due to the presence of polypi in the nose has been noticed only within the last ten years. I am disposed to think this is of more frequent occurrence than is generally supposed. Of the thirty-five cases which I have seen in the last year, four were attended by this symptom. The attacks were those of ordinary spasmodic asthma, giving rise to the same physical signs and attended with the usual nocturnal exacerbations. The asthma is generally cured by the removal of the polypi. In one of my cases, however, in which the disease had lasted two years, the asthmatic symptom was only relieved by the administration of iodide of potassium for about three months after the removal of the polypi. Voltolini first called attention to this reflex symptom of nasal polypus in 1881. Since that time similar observations have been made by Holden, Spencer, Porter, Todd, and others.

Diagnosis.—The diagnosis is usually quite simple. An inspection of the anterior nares with a good illumination revealing the characteristic grayish mass presenting between the turbinated bones and the septum. In many cases, however, the mucous membrane covering the polypi is of a red congested color, almost identical with that of the mucous membrane over the turbinated bones. In this case a probe will clear up the diagnosis, for by touching the presenting mass it will be found to be freely movable if it be a polypi. This manipulation also reveals the point of attachment, and should always, I think, be resorted to for the purpose of revealing not only the point of attachment of the growth, but also its size.

Treatment.—It seems somewhat strange that the earliest method of removing nasal polypi, that suggested by Hippocrates, should be practiced at this late day, but I believe it is a procedure not infrequently adopted. This consists in passing a cord through the nares into the pharynx and out at the mouth; to this is attached firmly a piece of sponge,

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which is then drawn from behind forward through the nasal passages. This results unquestionably in removing many of the growths, and to an extent in clearing the channel, but it is certainly a very rude and unsurgical method. I saw this operation done in my first year of attendance upon medical lectures, with, I confess, a feeling of admiration for the fortitude of the patient, but far more of dismay at the work for which I was preparing myself. Local applications of astringents, mainly in the form of powders, have been recommended by many writers, the claim being that under their influence these growths shrink up and drop off. The most efficacious of these, it is claimed, is tannin. I have never been able to satisfy myself that local astringents had any but a most temporary influence upon the disease.

Of late years we have seen frequent notices in the journals of the efficacy of injections into the body of a polypus, under the action of which they sloughed off. Acetic acid, tincture of iodine, persulphate of iron, a solution of corrosive sublimate, etc., have been recommended for this purpose. There is no question but a polyp can be destroyed by injecting it with acetic acid or probably many other drugs, but the process is a very tedious one. The injection creates a slough which remains in the passages for from three to five days, giving rise to an offensive odor and fetid discharge. This, of course, is a period of considerable discomfort to the patient. And, moreover, it is not possible to inject more than one or two polypi at a sitting, for it is not ordinarily possible to bring into view but one or two of them. It is then necessary to prolong the treatment over a considerable period of time.

By far the most common method of removing polypi from the nose is by the use of the forceps. They are recommended by the oldest writers on surgery, as well as by most modern text-books. The direction generally given is to pass the instrument up and seize the pedicle. I believe this to be an impossibility. The pedicle of a polyp is generally under the turbinated bone and not on its convexity, and there is very rarely sufficient room to pass the instrument. More-

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over, it is not possible to see the pedicle of a polyp. I do not think I have ever seen one until after the growth was removed from the nares. The nasal passages are exceedingly sensitive, and the introduction of any instrument, even a probe, is very painful. The introduction of a pair of forceps, which are made to grope about blindly in the passages until they have seized something, which, as a rule, the operator cannot know whether it be a polyp, or a portion of the healthy tissues, and then their forcible withdrawal with whatever tissue they may happen to have grasped, it seems to me is a most harsh and unsurgical procedure.

I do not think this is an exaggeration. It may be possible to remove a polyp very near the nostril with a pair of forceps without much injury to healthy parts, but the first introduction of the instrument bruises the parts somewhat and excites hemorrhage, and the field then becomes so entirely obscured that any further operating must necessarily be groping in the dark. Furthermore, I do not think it is feasible, as a rule, to remove all the growths with the forceps. The smaller ones are situated so deeply in the cavity, or are concealed so deeply beneath the turbinated bones, that they cannot be seized. For this reason it is often recommended that a portion of the turbinated bones be removed. I know of no justification for this procedure. The removal of bone involves the removal of healthy mucous membrane also. These tissues have an important function to perform in the nasal cavities and their removal is not justified unless they are diseased. In a majority of cases I believe them to be perfectly healthy in this disease. Even in very extensive removal and mutilation of the turbinated bones by the forceps operation, the polypi are liable to return. The most aggravated cases which come under my notice are those on which the forceps have been used.

As regards the use of the galvano-cautery, as recommended so strongly by Voltolini and Middledorpf, it has always seemed to me a ponderous and elaborate method. The use of an instrument in the nasal cavity heated to a white heat, invariably excites great inflammatory reaction,

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which oftentimes does much mischief. The more I see of the use of this instrument, I am the more inclined to entirely reject it. It unquestionably oftentimes does great harm, and moreover the cases are exceedingly rare in which simpler methods cannot be adopted with far better results.

A very great advance in the treatment of nasal polypi was made when Hilton devised the snare, which has been so extensively used since his day. This was a thoroughly surgical procedure. There were two features of this instrument which impaired its efficiency. It was mounted with soft annealed wire, which was passed over the growth, and the loop being drawn tight the polypi was torn from the attachment. The wire was soft, flexible, and easily bent; it was not easy, therefore, to pass to the base of the tumor. The loop was not sufficiently rigid to manipulate. Moreover, when the polypus was torn away, the polyp tissue being soft and friable, it would give easily and a portion of it would be left, from which a new growth would be liable to develop. The Jarvis snare-écraseur furnishes us with an instrument possessing all the advantages of the Hilton snare, and none of its disadvantages. This is mounted with steel piano-wire, which gives us a strong firm loop which can be easily manipulated, and, therefore, carried to any portion of the nasal cavity. A very important feature of this device I believe to be in the principle of the écraseur in contradistinction from that of the snare. The loop is carried over the polyp, and being pressed firmly against the mucous membrane from which the polyp springs the pedicle is slowly severed, and at the same time a small portion of the fibrous tissue of the membrane is torn out. This is very well seen in the specimens I show. I do not believe much in what is called the root of a tumor, but if there is such a thing it is shown here.

The only objection I find with the use of the Jarvis snare is that the hand is necessarily in the line of inspection, the instrument being straight. To obviate this I have had constructed the instrument shown (Fig. 2). The tube is bent in such a manner that the loop can be kept in view during the manipulation. Moreover, it is arranged so that the loop can

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be drawn up by traction with the fingers until the pedicle is embraced, when the removal is completed by turning the screw. As will be perceived, the device is merely a combination of Jarvis' and Wild's snares.

A nasal polyp, if removed in this manner, does not recur at the point of removal; the whole growth is removed, and no tissue remains from which a new development may occur. Moreover, the operation is accomplished with but little pain or hemorrhage, and by slowly taking one growth after another the nasal passage can be cleared at the first sitting sufficiently to give the greatest relief to respiration. The cavities cannot, however, be cleared at a single sitting. My

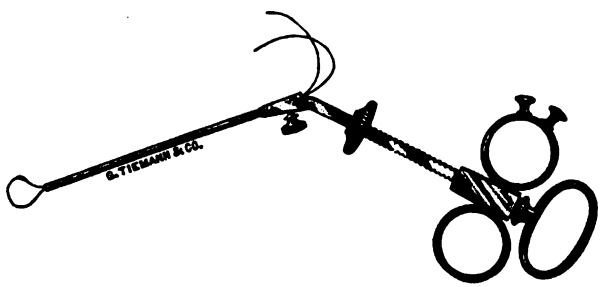

FIG 2.

usual procedure is to continue the operation until the patient is tired, or the passages become too much irritated, and then dismiss my patient for a few days or a week. If hemorrhage occurs a pledget of cotton can be inserted, and the bleeding will be arrested in a few minutes. It is possible with good illumination to see every portion of the nasal cavities. And if a polyp can be seen, no matter how deeply it is attached it can be removed. In this manner, therefore, I believe the disease can be entirely eradicated in usually about six or eight sittings. The question of course arises, Do these growths recur? I do not think they do if they have been thoroughly extirpated. I generally request my cases to present for examination a month after the operations have been finished, when, if I find no growths, I feel

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quite safe in assuring them that the disease is radically removed.

The principle, therefore, on which this affection should be treated is that of weeding a garden. The whole ground is to be gone over until every vestige of the tumors has been removed.

As to any local application to prevent recurrence, or escharotics to destroy the so-called roots, I do not believe them necessary. I have occasionally used the galvano-cautery or acetic acid after operating on cases which had previously been operated upon with forceps, but in other cases I have not found this necessary.

Of the thirty-five cases referred to there has been but one of recurrence. This was a patient whose turbinated bones had been much torn and mutilated by the forceps. It is too early, perhaps, to assert that the other cases are cured. Many of them I have examined since operating and find no evidence of disease. Others were patients at my clinic, of whom I have lost sight. I believe, however, I am perfectly justified in claiming a very large percentage of radical cures by the method described.

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ECZEMA: ITS PATHOLOGY AND PRINCIPLES OF TREATMENT.*

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MOST descriptions of the pathological anatomy of eczema are chiefly occupied with the changes that take place in the cutis, more especially in its papillary layer. The alterations to which the epidermis is subjected appear generally to have been regarded as of subordinate or secondary importance. It is true that some of the most striking, as well as earliest manifestations of the disease, such as the heat, redness, swelling, papulation, clearly point to vascular disorder in the true skin; while the thickening that characterizes the later stages is almost wholly due to pathological products accumulated in the tissues underneath the epidermis. Yet it may be shown that the latter structure with its complex layers, constituting the superficies of the skin, upon which the peculiar characters of the integument principally depend and out of which its chief appendages are evolved, plays a part in the pathology of eczema no less essential than that of the vascular stratum beneath. Indeed, there are reasons for believing that the epidermic lesions of the disease possess a primary, an initiative character that tends to mark the epidermis as the focal point of the eczematous process.

Vesiculation, as explained by many authorities, so far as the epidermic cells are concerned, is merely a passive process.

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* Read before the New York Academy of Medicine, January 18, 1883.

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The serum escaping from the blood-vessels of the papillæ forces its way into the mucous layer, crowding the cells asunder, and in the intercellular lacunæ, formed chiefly by elongated spindle-cells that have wandered into the epidermis from the vessels of the corium, the accumulating fluid becomes a vesicle. But the researches of Vulpian and others have shown that the cells of the rete participate more actively in this process. Certain of them undergo a sort of dropsical degeneration, especially those in the interpapillary spaces. Their nuclei disappear, and their protoplasm becomes transformed into a fluid substance, which gradually increases by imbibition of serum supplied from vessels below. At length, several such "dropsical" cells, contiguous to one another, coalesce through rupture of their cell-walls, and the collection of fluid thus formed constitutes the vesicle. According to Gaucher,* a reticular mesh-work remains where the vesicle has formed, consisting of the remnants of the walls of the obliterated cells. This explanation of how vesiculation and exudation are produced serves to account for the peculiar properties of the fluid exuded from an eczematous surface, differing as they do so materially from those of ordinary serum.

Meanwhile, according to Suchard,† as the vesicle gradually approaches the surface, a marked alteration takes place in the stratum granulosum. Ranvier had already shown that there is always a definite relation between this layer and the stratum corneum. In the normal condition, a fluid substance (*éléidine*) is formed in the stratum granulosum and diffused through the stratum lucidum. This substance, it is claimed, plays an important part in the process of cornification. It is always abundant where the cuticle is thick, as upon the palms and soles, while in situations where it is thin, the stratum granulosum is much reduced in thickness and no fluid is diffused through the stratum lucidum. In situations where the corneous layer is undeveloped, as upon the lips, the stratum granulosum and stratum lucidum disappear

* Ann. de Derm. et Syph., 1881, 2 S., II., 263-7.

† Arch. de Phys. Norm. et Path., 1882, 2 S., X., 205-212.

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entirely, and the cells of the superficial layer retain their nuclei. Similarly, in certain pathological conditions, Suchard found that impairment of the granular layer was accompanied with failure of cornification. In scaly diseases, like psoriasis or the squamous form of eczema, the granular layer was absent, and the superficial cells of the epidermis retained their nuclei and failed to become corneous. The granular layer disappeared in the same way over the eczematous vesicle.

Doubtless all the metamorphic changes that the epidermis undergoes in eczema have not yet been described. Further investigation, it may reasonably be supposed, will add materially to their complexity and importance. Enough have been shown to indicate an independent action on the part of the epidermic cells in the inflammatory process of eczema. "The doctrine of emigration" fails to account for the vesicular process that takes place in the rete, as it does for the endogenous formations that mark the inflammation of other non-vascular structures, such as the cornea, cartilage tissue, or the epiploa. The formative changes that take place in these structures when inflamed originate in the normal, indigenous cells of the part, and not in cells that have wandered from the blood-vessels. But though the pathological process is initiated in the cells of these structures, the adjacent vascular tissue soon sympathizes. And so in the skin. The papillary vessels respond to an irritation in the epidermis as do the subconjunctival vessels in irritation of the cornea.

But, before proceeding further, let us consider what are the qualifications of the epidermis for initiating an irritative process in the skin. First, in this connection, a word with regard to the subject of the cutaneous nerves. It was long supposed that the nerves of the skin did not extend beyond the papillary layer. The corpuscles of Meissner and Krause, which occupy a portion of the papillæ, are yet commonly regarded as the special organs of the sense of touch. But the fact that they are not everywhere present shows that they are not absolutely essential. It is now well known

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that the nerves do not all stop at the epidermis, but that the latter is abundantly supplied with nervous filaments. Merkel, Ranvier, Ditlevesen, and others, first demonstrated the fact in lower animals. The filaments terminate by club-shaped extremities. In the human subject, it was shown by Langerhans, Eberth, and Roncet, that the epidermis contained not only numerous nerves, but also they described certain stellate bodies in which the filaments were lost, and which these writers regarded as nerve-cells. The latest contribution upon this topic is from Unna.* He refers to a previous paper by Pfitzner, who first discovered in the epidermis of the larvæ of the frog and salamander, at a certain period of development, nerves that terminated, after penetrating the cell-wall of each prickle-cell, with small bulbous extremities near the nucleus. Every cell contained two of these terminal filaments. Afterward the same observation was made in the epidermis of the human subject. Unna, pursuing the investigation, fully confirms the results of his predecessor. His paper is accompanied with photographs, in which the appearances are very clearly exhibited. A striking feature of the appearance is the invariable association in every cell of the terminal bulbs in pairs. They did not appear to be branches of one twig, but usually approached the cell from different directions. It is difficult to see what bearing these researches may have in the future upon the physiology of the peripheral nerves, as well as upon the pathology of cutaneous diseases. They certainly reveal in the epidermis a nervous development hitherto wholly unsuspected. Unquestionably these nerves must play an important part in the pathology of eczema.

The most constant and essential factors in the symptomatology of eczema are sensory disturbance and trophic change in the epidermis. The trophic changes that take place in the derma I regard as secondary and contingent. Impairment of the integrity of the epidermis is the necessary condition of every form and phase of eczema. It, more

*Die Nervenendigung in der Menschlichen Haut. Monatshefte f. prak. Derm., Oct., 1882, I., 8.

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than any other feature of the disease, distinguishes it from those inflammatory diseases of the skin that owe their origin mainly to vaso-motor disturbance and are situated in the superficial layer of the cutis. In the erythemata, the epidermis is rarely seriously involved, and then only secondarily. The desquamation that occasionally follows is such as is common to all simple inflammations of the skin, and is the result of nutritive impairment in sympathy with the vascular disturbance beneath, but an impairment in no wise corresponding to the degenerative lesions of the epidermis to which eczema gives rise. It is more than probable that this trophic change of the epidermis in eczema is under the influence of the epidermic nerves.

Though there is no positive evidence that the epidermic nerves are related to the sense of touch, there is reason to believe that itching—which is tactile sense perverted—is due to their disorder. Pruritus is a marked feature of such cutaneous diseases as are accompanied by lesions, only when they implicate the mucous layer. In urticaria, the only form of erythematous disease in which there is decided itching, there is a violent invasion of the rete cells by effused serum. Doubtless, also, hyperæsthesia of the nerves has much to do with the itching and, perhaps, also motile disturbance. It is a noticeable fact that in many of the pruriginous diseases, such as prurigo and lichen, the arrectores pili, which extend close to the stratum mucosum, undergo decided hypertrophy. But in those diseases there is also marked implication of the mucous layer of the epidermis. In prurigo, beside great thickening of the rete, the external root-sheath of the hair follicles, which is but a prolongation of the mucous layer of the skin, undergoes marked hyperplasia; and a similar condition prevails in lichen-ruber and planus. In scabies, a disease in which the itching is excessive, the itch-mite inhabits and feeds upon the rete mucosum. In psoriasis, the itching is slight except in the beginning; but it is not claimed that pruritus is necessary to every disease in which the rete is affected. In psoriasis, it appears that the changes that the prickle-cells undergo

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are not of such a character as to compromise the sensitive nerves. Most of the vesicular diseases are attended with itching when the vesicle is deep-seated. In superficial vesicles, such as the sudamina, where they are contained within the stratum corneum, itching is absent. The deep vesicles of zoster do not generally itch, pruritus giving place to the greater perversion of pain. In herpes facialis and progenitalis, the itching is marked, and the same is true of pemphigus.

With regard to the pathological anatomy of the cutaneous nerves in eczema, but little is known. Colomiatti* found in several instances, both in acute and chronic eczema, the lesions of neuritis. They consisted in segmentation of the medullary substance and in the disappearance of the axis cylinder. The segmentation proceeded till little granules, like fat molecules, were formed. The process extended from the superficial to the deeper layers. The nerves were regenerated as healing took place. Leloir† was unable to confirm these investigations. In the specimens examined by him the lesions did not appear. Marcacci described a case of universal eczema that was associated with lesions of the cervical and cœliac ganglia. There are many other instances on record of a corresponding character showing that eczema may occur in connection with a great variety of nervous lesions. They chiefly serve to indicate the intimate relation of the disease to the nervous system. Doubtless the initial motive of the morbid process—the exciting cause—may be developed from various sources, direct (external) irritation of the epidermis, reflex irritations, central nervous derangement, or diseases of the nerves, either in their continuity or at their periphery. Of greater moment to the practitioner are the predisposing causes, but they will be considered in connection with the subject of internal treatment.

In eczema, then, we have to do with a disease, the main factors of which are a cutaneous inflammation, of a catarrhal

* Giorn. ital. delle mal ven. e della pelle, XIV., 3, p. 129.
† Rev. de Sci. Med., No. 38, Apr., 1882.

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character, seated primarily in the mucous layer of the epidermis, which incidentally involves the derma to a greater or less extent, and is accompanied with marked disorder of the tactile sense. Furthermore, it is a disease in which there is ordinarily but little disposition to spontaneous recovery. The obvious therapeutic indications are, first, to allay irritation, and second, to assist repair. The one requires the elimination, so far as possible, of all sources of irritation whether extraneous or inherent, together with protection of the damaged epidermis. The other indicates a resort to such therapeutic stimulants as will combat the tendency to chronicity. Measures of rest and measures of stimulation comprise the whole treatment of eczema. In applying our treatment, two methods of approach are possible, a mediate one and an immediate one; the first by internal medication, the other by topical application. The easy accessibility of the suffering organ in eczema would naturally suggest first the method of direct application—the method which we will first consider.

In the local treatment of eczema, we employ agents that are either mechanical, chemical, or dynamic in their action. The agents that act mechanically are chiefly employed for purposes of protection. They answer the same purpose as the simple dressing for a wound. They include various inert powders, lotions, simple ointments, and emollient applications generally. The indications for the different varieties of this class are not precisely identical. As a rule, the highest grade of inflammation, as in the acute erythematous form, is best treated by wet applications—applications that abstract the local heat by evaporation, while at the same time they prevent desiccation of the superficial epidermis, which is usually in a harsh, dry condition that tends to increase the irritability of the subjacent nerves. The lotion may either hold in suspension powdery substances that collect upon the epidermis, and supply a soothing envelope to the part, or in it may be dissolved certain chemical materials that exert a slight modifying effect, such as mild astringents or alkalies. In using lotions, however,

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it is of importance that the application be continuous. Alternately wetting and drying the inflamed skin is always attended with irritation. The wash is generally improved by the addition of a small quantity of glycerin. Undiluted glycerin is an irritant. Emulsions are also well suited to this stage of the disease. When the inflammation is a little less intense (acute papular eczema), the best applications are the insoluble powders. Between lycopodium, starch-powder, talc, calamine, oxide of zinc, or the like, there is little to choose. It is chiefly essential that the applications should be copious and frequent. The effect is increased by first smearing the skin lightly with cold cream, some soothing emulsion, or glycerin and water, which affords a surface to which the powder will better adhere. A little later, and the period for the use of ointments has arrived. The skin has become rougher and harsher, the cuticle is brittle and ragged, the surface is dotted with scales, crusts, and abrasions. Here and there vesicles appear, or, more commonly, minute punctate excoriations. From this time forth, in the majority of cases, the cure proceeds, under the continuous protection of an appropriate ointment, until such time as the epidermis is sufficiently regenerated to perform its protective function unaided. Such an ointment requires to be perfectly non-irritating; it must be smooth and homogeneous, and entirely free from rancidity; it must not be so greasy as to become easily displaced or, by softening the cuticle too much, render it more vulnerable, but of such a firm consistency as to afford a perfect shelter to the exposed and irritable cutaneous structures, and, at the same time, hinder undue desiccation. It is rare to find any preparation that so perfectly fulfills those requirements as our common zinc ointment. Indeed, for general use, I know of none to compare with it. In the great majority of cases where a protective ointment is indicated, it is all-sufficient; and rarely is any other needed. Under its shelter and control, stimulation may be effected by certain measures that are resorted to intermittently or, if a more constant stimulus is desired, the ointment may be modified

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by the addition of various medicaments. But eczema has certain phases to which ointments are not suited. That they should not be begun at a very acute stage of the disease has already been indicated, but there are other circumstances under which their use is contra-indicated. Where a more or less extensive surface is eroded and exudes a copious and ichorous discharge, the effect of all ointments is generally unfavorable. In such a condition, either an astringent wash is indicated, or, better, an absorbent powder. The absorbent effect of the powder may be increased by adding a little gypsum in the proportion of one to four or one to eight, care being taken that no gritty particles are present.

We come now to a class of agents, the action of which is more complex and obscure, agents that act as modifiers of vital action. By far the most important of these are the alkalies. Their value in the treatment of eczema in almost every stage of the malady has long been established. In fact, there is scarcely a form of inflammation to which either the cutaneous or mucous surfaces are subject that is not beneficially affected by their use. Chemistry may partly explain their action, but the inquiry verges upon the domain of vital dynamics. One important feature of their action is the sedative influence they exercise over sensory nerves. No more certain antipruritic exists, and no remedy affords greater relief for the heat and burning of an inflamed skin than external alkaline applications. The virtues of the alkaline bath I believe to be rather under than overestimated. Although medicinal agents are probably unable to penetrate the intact cuticle, yet when they are applied over an extensive surface, they gain sufficient access to produce decided effects. Employed over a surface of narrow limits, the alkaline effect is most marked when the corneous layer is abraded and the nervous stratum of the epidermis is exposed. So long as the eczema partakes of an acute character the alkali is used in the form of dilute washes; but later, when pathological products begin to accumulate upon the surface, and are with some difficulty dislodged, its action is promoted by

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using it in the form of soap. The kind of soap employed should vary with the phase and character of the case. In old chronic cases, where there is a decided thickening and thick laminæ of adherent scales are being constantly formed, the stronger potash soaps are indicated,* while in cases in which the scales and crusts are thinner, and the skin less tolerant of severe measures, the milder soda soaps are used, preferably those made with glycerin, which usually contain a relatively small proportion of alkali (Sarg's, Rieger's, or Pear's soaps being the best). In squamous eczema, the so-called "soap treatment," which we owe to Hebra, has no equal. But to be effective, it must be thorough. Of themselves, the frictions would cause useless irritation were they not associated with the removal of a source of greater disturbance. The action in this method of treatment may be partly substitutive, but there is often surprisingly little irritative reaction, and the relief is almost immediate. In squamous eczema, there are almost always vesicles deep down in the rete, imprisoned by the desiccated epidermis or dried secretion above, and, under these circumstances, the epidermic nerves suffer an intense irritation. The purpose of the soap is to thoroughly clear away these irritating pathological products, to evacuate ichorous fluid which has formed in the vesicles, and to bring the liberated alkali in direct contact with the diseased tissue, thereby modifying the vital processes and exerting a direct sedative influence upon the adjacent nerves. Though this, I believe, is the chief purpose of the operation, its stimulant effect doubtless tends to promote absorption, and thus still further assists the reparative effort. It is seldom that a stronger alkali than that contained in soap is required except for very limited application. A strong alkaline solution is less available than the soap, for the reason that its caustic action is less uniformly exerted, acting too deeply where the epidermis is abraded, thus interfering with its adequate use where it is especially needed

* For this purpose, either the so-called *Schmierseife* of the Germans may be used; or, better, the olive potash soap, which is sold here under the name of "Sapo Olivæ præparatus," and was first brought into notice by Dr. G. H. Fox.

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for the removal of accumulated scales. As a simple caustic, agents that act more superficially are preferable, such as carbolic acid or the nitrate of silver. As a general rule, the nitrate of silver or its solution is most useful in circumscribed forms of moist eczema, in which there is a pyogenic condition.

For the pruritus of eczema, the virtues of simple hot water deserve especial mention. They probably depend upon a twofold action, the first effect of which is to stop the itching by substituting the sense of smarting. The same effect is produced temporarily by violent scratching. The paræsthesia " of pain prevails over and excludes the " paræsthesia " of pruritus. This, in the case of the hot water, is succeeded by a sedative effect, which is secondary, and the result of a certain local depressant or enervating action that is the equivalent of the general relaxation and exhaustion which follows the full hot bath when too prolonged. In order to insure a continuance of the antipruritic effect of the hot water, it is necessary that the applications should not be stopped too soon.

Carbolic acid is a remedy of great usefulness in eczema. Its action varies according to the degree of its concentration. In its strongest form, its effect is to annihilate vital action. In a moderately concentrated form (from 1 : 4 to 1 : 8), it annuls local excitement, and produces sedation; while in a dilute form its action corresponds very closely to that of the tarry remedies. The effect of the first form, in which the drug is a caustic, is exceedingly well adapted to the treatment of irritable fissures in eczema, for the reason that little or no inflammatory action is excited by it, while it acts as an anæsthetic to the surrounding nerves. In the second form, carbolic acid has very decided antipruritic virtues. It is adapted to cases in which the region affected is of small extent and pruritus is intense, a notable example of which is eczema of the anus. In the third form, the indications for this remedy are nearly identical with those of tar and its congeners. Where the latter are objectionable, carbolic acid may be used as a succedaneum.

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The action of tar in cutaneous diseases is doubtless analogous to that of the terebinthinate and balsamic remedies in diseases of the mucous membranes. Whatever the nature of the action of these remedies may be, there is no question of their power to modify inflamed surfaces. Generally speaking, they exert their salutary effects after the acme of the inflammation has passed; the nerves have lost some of their preternatural irritability, and the condition is one of impaired energy, of relaxation, of congestion more or less passive. It is under these circumstances that this class of remedies is especially indicated. They renovate the vascular tension and check the excessive secretions. In the eczematous inflammation of the skin, the period for commencing the tarry applications appears to be a little more delayed than is the case with regard to the corresponding remedies in inflammation of mucous membranes; perhaps for the reason that in the latter case, when the drug reaches the seat of trouble it has become less irritating, through dilution or modification of its active ingredients. But it is a good rule in eczema, that during the stage of active exudation in the mucous layer, tar is contra-indicated. Its healing virtue is best evinced when the signs of the disease are mostly confined to the corneous layer of the epidermis and the superficial blood-vessels. Desquamation still continues while the papillæ are passively congested. Though this rule applies to tar as generally employed, as well as to the related substances naphthol and thymol, it does not necessarily to all the remedies to which tar is akin. In the benzoated zinc ointment we employ an agent that belongs to the same class of remedies we are considering, the effect of which should not be ignored. Though present in too small quantity to cause any perceptible irritation except in the rarest instances, it is not improbable that it has a certain modifying action. The efficacy of all of these remedies is doubtless largely assisted by their volatility, enabling them readily to penetrate the skin and perform their appropriate reactions. Our management of these remedies would admit of great improvement. It is doubtful if we avail ourselves

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of the benefits of which they are capable, except in a very imperfect degree. Increased success in the treatment of eczema may be looked for in the future mainly in the direction of improved methods for making the virtues of this class of therapeutic agents more available at an earlier stage of the disease.

The agents of the narcotic class that occasionally find employment in the local treatment of eczema, as palliatives, require no especial consideration. Their effect is often overestimated. Unless applied to an abraded surface, the action must be very slight. Certain of them, however, by reason of their volatility (notably camphor), are useful adjuvants in case of pruritus.

The last class of agents to which I would call attention is that of the mercurials. Though sometimes useful at earlier periods of the disease, their chief rôle comes into play at its latest stage—a stage in which the skin is no longer in active inflammation (though a few remaining vesicles need not preclude their use), but suffering in its nutrition, owing to the presence, mostly in the cutis and subcutaneous tissues, of the accumulated products of inflammation. It is in the removal of such products, whether cellular or fibrous, that the potency of mercury as a therapeutic agent is especially exhibited. This property it possesses by virtue of its hostility to all living organisms, attacking those tissues first that have been recently formed and are but imperfectly organized, impairing their vitality and predisposing them to rapid subinvolution and resorption. While this is its peculiar, its pathognomonic effect, it also has, as often employed, a stimulant or substitutive action in common with other irritants, but that the latter is not its sole action is evident from the difference between the effects produced by the mercurials and those of other irritating applications.

An exceedingly useful remedy in the treatment of advanced eczema with decided thickening, is the "impermeable dressing," more especially the rubber applications. Their effect is to macerate the thickened and desiccated cuticle, which, being removed, enables the deep vesicles to dis-

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charge their contents, while at the same time a substitutive inflammation is set up, which, by countervailing the chronic eczematous process temporarily, tends to assist repair. When this artificial inflammation becomes severe, it necessitates the dressing being removed. It causes a new development of papules and vesicles, and sometimes large unilocular bullæ, the higher grade of inflammation induced producing the same effect as a blister or a burn.

I have thus briefly indicated the more important external agents, the value of which in the treatment of eczema has been established by experience. Though they embrace a wide range in therapeutics, including as they do emollients, sedatives, astringents, irritants, excitants, and alteratives, they are divisible into two classes, corresponding to the two main indications of the disease. To one class belongs the function of protection; while it is the function of the other to assist and direct reparative effort. In the early stages of the disease, before the morbid habit has become confirmed and the natural reparative power is but little impaired, protective measures may suffice unaided to effect a cure; indeed, throughout the whole course of the treatment their assistance is more or less indispensable. They not only prepare the way for the stimulant or modifying agents, but, when the latter come into play, serve to moderate and control their effects. It is upon the proper apportionment of these two opposed but virtually co-operating therapeutic functions that the successful treatment of eczema will mainly depend.

When is it necessary, then, to resort to internal medication? The indications that are supposed to require general treatment in eczema may be divided into four sets: (1) For the relief of internal disorders that affect the skin by reflex irritation; (2) to remedy general debility or special systemic diseases which are accompanied with defective innervation or innutrition of the skin; (3) to aid the local resources of repair by the administration of drugs that either act directly upon the skin by selective affinity, or, else, (4) set up internally a transpositive irritation by means of which a share of the cutaneous excitement is diverted to other organs.

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Sometimes an attack of eczema, more particularly when acute, appears to owe its origin to internal causes, for the reason that no unusual source of irritation has affected the skin externally. Oftener eczema is the combined effect of an irritation acting from within and another acting from without. In the latter case the cause is exciting; in the former it is generally predisposing. Reflex irritation of the skin, such as may be excited by disturbances of the digestive or generative functions, rarely suffices alone to cause the disease; but when it is prolonged the cutaneous nerves become so irritable and debilitated that they can no longer tolerate external influences which, under ordinary circumstances, would be insignificant. Likewise with regard to those systemic diseases which are attended with a general debility, such as gout, rheumatism, lithæmia, uræmia, diabetes, and the like, the nutrition of the skin suffers in common with that of the other tissues, and there is developed a predisposition to disease. But why should these remote sources of irritation and these predisposing causes avail to produce eczema, only, as they do, in certain individuals? Back of the general predisposition that arises from conditions which affect the health at large, we are compelled to infer the existence of a special cause that determines the cutaneous effect in that limited class of individuals known as eczematous.

According to the French school of dermatology, this special cutaneous susceptibility is attributable to a special dyscrasia. Eczema is necessarily the expression of a systemic malady which, at certain periods and under various influences, becomes intensified, betraying itself in an outbreak of eczema upon the skin. Of this peculiar diathesis "*les dartres*" constitute the sole manifestation and evidence. But is this explanation the only possible one? Is no consideration due the inherent nature of the skin affected, its peculiarities of organization, the measure of its tolerance of irritating influences? Why should not the skins of different individuals differ as much in their constitution and morbid tendencies as do their other organs, their nervous, digestive, pulmon-

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ary, or muscular systems? Some people have "weak" eyes; others are predisposed to caries of the teeth; some have feeble digestion or "weak" lungs; others still are "neurotic." Some of these weaknesses evince defects of anatomical structure; in others the defect in organization is less patent, but is betrayed by frequent derangement of function and proneness to disease. So with the eczematous subject. He is by no means necessarily a person whose general health is impaired, though at every departure from health the skin is quick to take offence. How common it is to see well nourished, robust children, in whose general condition not a flaw can be detected, with the single exception of a persistent eczema! It is the skin alone that suffers, and that upon a minimum of provocation. Whatever may have been the original, in- or external, exciting cause, the cutaneous effect is a wholly disproportionate one—such an effect as would only be produced upon an organ capable of but a feeble resistance. Such individuals commonly have dry, harsh, irritable, and itchy skins. Not always, however. The skins of different eczematous subjects differ in the degree of their vulnerability as well as in their disposition to recovery after an eczematous outbreak has occurred.

But why, it will be asked, should the particular disease eczema be such a constant effect? Why not other forms of cutaneous inflammation? For the reason that eczema is the natural and the usual expression of a simple inflammatory action in the epidermis. So soon as an irritation can no longer be tolerated by this tissue, the vitality of the part begins to succumb, and the legitimate outcome is eczema. Its physiognomy is not always the same, and I am not prepared to say that there may not be allotropic forms corresponding to this inflammatory action, depending upon peculiarities of the cutaneous organism in the individual, which diverge so widely from the simple type as to present the features of a different disease. The relations of psoriasis to eczema, or possibly those of other diseases that chiefly implicate the epidermis, would form an interesting subject of study in this connection.

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It follows from what has been said that, whatever the predisposing causes of eczema that may arise in the economy at large, the most essential predisposition inheres in the skin itself. Eczema, then, is essentially a local disease, and the most rational treatment is that which addresses itself most directly to the offending part. By oblique methods, however, we may obtain great assistance, which should not be ignored. At the beginning of treatment or when the inflammation is either active or obstinate, the effect of a powerful internal diversion will often so ease the cutaneous excitement as to determine the success of the local treatment. Tonics, regimen, purgatives, diuretics, alkalies, have their appropriate place, and in discreet hands become invaluable adjuvants. I cannot but assign to internal medication, however, a subordinate rank. Eczema has no specific. I know of no salutary effect of which any internal remedy is capable, through a selective affinity for the tissue affected in eczema, that may not more certainly and safely be produced by immediate external medication. Remedies that have such a selective action there doubtless are, but their effect is so conjoined with or conditioned by modifications of the economy at large, which we can neither foresee nor control, that upon the whole this effect becomes of doubtful utility. With regard to certain of these remedies, more especially those of the narcotic class, I believe that they should be mentioned but to be condemned. When obvious derangements exist in the general system or in some internal organ, it is the manifest duty of the physician to address himself to their relief. But unless their influence upon the cutaneous disease is well marked, I should expect comparatively little assistance in this direction. So far as chronic eczema is concerned—that is, the prevailing and the most characteristic form of the disease—in a large proportion of cases the original cause has long ceased to be operative, and though some predisposing influence may still proceed from general conditions that depart more or less from a perfect state of health, the complete relief of such conditions is often impracticable, nor is

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it by any means necessary to a cure of the eczema. In a majority of the cases, local treatment is well able to cope with the cutaneous disease single-handed.

Diligent search for all sources of morbid influence, whether remote or near, is scientific and praiseworthy, but if led by the preconception that every eczema has an essential internal cause, it will often prove, I am convinced, to be the pursuit of a phantom.

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ON THE EQUALLY FAULTY OR CONTRACTED PELVIS, WITH THE HISTORY OF A CASE OF LABOR, THE NON-DELIVERY OF THE CHILD, AND THE DEATH OF THE MOTHER AFTER CRANIOTOMY AND CEPHALOTRIPSY.*

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THE unfortunate termination of the following case of labor, and the death of the mother undelivered after craniotomy and cephalotripsy, induces me to present its history, and to offer a few comments on the subject of faulty or contracted pelvis, including the equally contracted or *justo-minor*, the infantile or immature, and the masculine or funnel-shaped.

I am in full accord with the remark of a celebrated obstetrician, and realize fully its application: "That one does not feel much disposed to announce the failure of the delivery of his patient, though he is eager to do so when he is enabled to quit the field successful."

The history of this case was written by Dr. C. H. Greenough up to the time I was requested to join Drs. Waterman, Judson, and another physician.

The patient was a healthy young woman, twenty-nine years of age; primipara; married not quite a year. A physician had seen her previously, but had left before I visited her (which I did at the request of Dr. M. W. Waterman, as his official public duties did not permit his steady attendance), which was on July 28th, 1882, at 7 A. M.

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* Read before the New York Academy of Medicine, March 1, 1883.

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I found her in labor, pains recurring at intervals of ten minutes, and being of short duration. The liquor amnii had escaped at 6.30 A. M. On examination, the os was found to be dilated to the size of a half-dollar, the head presenting in the left occipito-anterior position. As no advance had taken place at 11.30 A. M., I sent for Dr. Waterman. Ergot was given, producing but slight increase of the pains, and at 1.30 P. M., as no further advance had occurred, Dr. Simmons was requested to meet us, when (at 3 P. M.) one-third of a grain of morphine was given hypodermically. At 4 P. M., the patient was quiet and slept, the pains having ceased.

I then left, and did not see her till the next morning at 9.30 o'clock, meeting Drs. Simmons and Waterman. On examination, the os was found to be widely dilated. The head, recognized as before, was arrested at the brim. Forceps were advised, and applied by Dr. Simmons; no change or benefit resulting from their application, although all of us made an effort to deliver the head.

Dr. E. A. Judson was added to the consultation at 12 o'clock. Version was decided upon, and was attempted by Dr. Judson. A foot was brought to the brim, but could not be delivered, and it having receded, craniotomy was advised and done by Dr. Greenough in the hope of saving the mother's life.

Dr. Taylor saw the patient at 3 P. M. of the same day, and found her somewhat exhausted, with slight, short, jerky, inefficient pains. Pulse 120; respiration normal. There was no tenderness of the abdomen, and she could assist in placing herself in position for delivery. The external organs were considerably swollen and slightly bluish in appearance. The vagina was edematous—so much so, indeed, as almost to preclude the necessary examination. There was no elasticity of the soft structures. The position of the head was now transverse at the superior strait; brow presenting; occiput to the left.

The perforation made was found to be through the frontal bone, near the supra-orbital plate on the right side, a portion of the right orbital ridge having been removed by the craniotomy forceps. Very little of the cerebral mass had escaped at this time, being prevented by the condition of the maternal soft structures.

Making no further investigation, I supposed from the history of the case that there was some defect in the pelvis, or, as was supposed by the gentlemen present, that it might

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be a very large child. The cephalotribe was applied, the handles brought in close apposition, and the brain more freely evacuated. Traction was then made for some twenty minutes, but nothing was gained towards the descent of the head, although the compression was to the extreme limit of the instrument (1½ inches between the blades). Removing the instrument and examining, I found, as is not very uncommon, that the cranium had regained the same form it had previous to the crushing.

On account of the resiliency of the cranial bones, I applied my long, narrow-bladed forceps that I might inclose the head within the blades more perfectly than was possible with the cephalotribe. They were of value in bringing the head into the cavity of the pelvis, having a good and secure hold. This accomplished, the right-angled blunt hook was inserted into the child's mouth, and a frank face presentation made, so that we might bring the head obliquely further down. Meigs' "long embryotomy forceps" were then tried, and by steady, firm traction for half an hour, the head was brought to the inferior strait, and after three hours' time was delivered, face presenting, perfectly crushed. There was not sufficient space between the head and pubes to allow a thin towel to be put around the child's neck to be used as a tractor.

As no traction by the hands could effect the least advance of the shoulders, narrow but strong cord was placed around the neck, and traction made. A slight stretching of the neck was accomplished, and space enough obtained to admit of the introduction of the hand, in the endeavor to bring down the arm. After unavailing attempts to flex or alter its position, I found that it was impossible, so tightly were the shoulders wedged in the brim. After the introduction of the hand, I realized that the defect or narrowness of the pelvis was not at the conjugate, but that it was generally contracted, there not being sufficient space in the cavity to allow me to effect the slightest change in the position of the arm by any possible manipulation. The right-angled blunt hook was then applied, firm and steady traction made, but it was powerless to accomplish any alteration whatever in the position. This effort to deliver the body of the child occupied another hour. Hypodermic injections of whiskey were given to sustain the patient, but all our efforts failed, and she died at 7 P.M., thirty-six hours after I saw her.

The title I have selected for the remarks I propose to

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make on the naturally faulty or contracted pelvis, where the size, shape, and diameters do not correspond with those of the normal, may appear to be objectionable, as having no definite or specific character.

It is nevertheless a condition of the pelvis which F. C. Nägele has referred to, and which, from my own experience, is more frequently met with than is generally supposed.

These forms or classes of pelvis require as much attention and study from an obstetrical point of view as those which have claimed so much consideration, and which arise from constitutional disease, as rickets, malacosteon, or some systemic dyscrasia.

These forms of pelvis give, as a general rule, no positive evidence or even suspicion beforehand that a faulty condition of the osseous structure exists, and are often not recognizable till labor has commenced, and in many instances not until it is necessary to accomplish the delivery of the child instrumentally.

We recognize those pelves which are deformed consequent on disease by certain titles, which are given to indicate the special form or shape, as the simple flat, the figure of eight, the triangle, the transverse, the cordiform, the ovate, and the obliquely ovate. All these forms of pelves are considered as arising from constitutional disease. Rickets, as the most usual and frequent cause, affecting not only the pelvis, but also the spinal column and extremities.

The equally contracted or, as it is sometimes called, the justo-minor, the infantile or immature, and the masculine or funnel-shaped pelves are considered as caused by the arrest of development of the osseous structure, as the result of some important impairment of the constitution. The infantile or immature might appropriately be viewed in this light, but the funnel-shaped and the equally contracted, with few exceptions, give no evidence that they are of a rickety nature. The infantile, on account of the want of development of its osseous structure, is from that cause correctly and truly called an immature pelvis.

The funnel-shaped and the equally contracted are the

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very reverse, and are far from resembling the pelvis of the infant. The description given of these pelves testifies to this mistaken view.

The peculiarities attending the infantile, as the arrest of development takes place not before, but after the age of puberty, and the perfect development of the sexual organs, and before the pubic and the sacro-iliac cartilages become ossified, have no special relations to a rickety constitution. There are cases where the bony union has not taken place until after the age of thirty or more years, and even instances where it has not occurred at all.

The male or funnel-shaped, or, as it is sometimes called, the Irish pelvis, is, on the contrary, the result of an advanced condition of ossification before the time of puberty, and illustrates a healthy constitution.

The equally faulty (even when the extremely narrowed pelvis measures an inch, or even if it is lessened to one-third or one-half inch in all its diameters) has no claim to be considered as an infantile or immature pelvis. Barns considers that the equally faulty or justo-minor pelvis as a product of disease may be doubted. He thinks that the term justo-minor might usefully be discarded, but, nevertheless, informs us "that a proportionately perfect pelvis reduced in all its diameters must be regarded as an infantile pelvis, and that as its result the female is of small stature."

In my remarks I discard the so-called dwarf pelvis, "the pelvis nana."

The equally faulty pelvis that I have under consideration occurs in women well-formed in every respect, who, in contour of person, and physically, give no evidence of abnormality. It does not by any means follow that a female of small stature should have a pelvis too small for parturition. On the contrary, I have seen women of very short stature bear children easily, safely, and quickly.

An interesting case came under my observation, at Bellevue Hospital, in 1862, in a girl of twelve years, whom I found in the lying-in ward, on one of my visits, and who, when I requested her to leave the ward, informed me that she was

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"going to have a baby." On examination, I realized the truthfulness of her statement, and in less than an hour she was delivered of twins, weighing five and one-half pounds each. She had a most excellent "getting up."

Of the faulty condition of the female pelvis, which appertains to this class, very little has been and is said, and in all the latest works on the subject, with the exception of some German writers, there is only a mere reference that such a class exists.

The remark which was made by Stein, Jr., and by Nägele, more than half a century ago, "that the subject was scarcely considered worthy of notice by obstetricians," is as correct and true at the present day as then. Respecting the treatment, they say: "The obstetrician must help himself as best he can."

Velpeau informs us "that in a considerable number of women the pelvis of this form retains, after the age of puberty, the characters it had in infancy," and that "he had yet to learn that it had ever necessitated a serious operation." Velpeau, a few years after this declaration, met with two cases which were published in the *Journal complimentaire*, and in which the pelves were so small that one woman died undelivered, and the other underwent the Cesarean section.

The form of pelvis usually met with in this country, and in the more respectable class of society, is the simple flat non-rickety. It is to this form of naturally defective pelvis that the attention of the profession has been more particularly directed. But this form, not consequent on disease, is only occasionally recognized, even in the higher circles of society. The conjugate is seldom as low as two and one-half inches; generally, it ranges from three and one-fourth to three and one-half inches. How rarely, in this form, has craniotomy, much less cephalotripsy been performed? I have no hesitation in saying, from my own experience, that I have met more frequently in private practice with cases of a minor degree of equally faulty pelvis (from one-third to one-half inch) requiring craniotomy than of the simple flat non-rickety pelvis.

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In almost all the cases recorded of the equally faulty or contracted pelvis where the diminution is from three-fourths to one inch, both mother and child are lost. In pelves of the same order, but of a minor degree (contracted from one-third to one-half inch), the child is generally sacrificed, unless it be very small. It is seldom born living at full term. The mother's life is also placed in great jeopardy, unless a timely operation be performed. An instance has been related where as many as sixteen children were destroyed in successive labors, each head being locked in the mother's pelvis, and which was just too small to allow of its being delivered.

In these cases, the difficulty is attributed to the large size of the child's head and its too advanced ossification, or it may be to very large shoulders, measuring twenty-one to twenty-two inches around, of which I have seen three instances; or, again, it may be that other causes produce the tedious labor.

I believe many cases of this nature have occurred which have not been recognized, which demanded not only instrumental assistance, but craniotomy and cephalotripsy, necessitating an operation which I think does not correspond to the magnitude of the evil when the pelvis is diminished only one-half inch.

Rokitansky considers that the smaller pelves bearing traces of their growth having been arrested in consequence of rickets are at the same time misshapen or deformed.

Alexander Shaw, of Edinburgh, has been credited with saying, in his two most valuable monographs on the subject of rickets, "that proportionate contraction of the pelvic diameters is very common in rickety subjects consequent on a want of proper development, though not to constitutional disease." I have not been able to find this opinion of his in the two papers he published, one in the *Medico-Chirurgical Transactions*, vol. 17, 1832, the other in the *London Med. Gazette* for 1834. Shaw does say, however, that "in the infant the head, thorax, and upper extremities are usually more advanced in their formation than the pelvis and lower

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limbs. In the adult it is the very reverse. Should, however, from any such cause as rickets, the pelvis and lower limbs (through the general growth of the bones) be not increased rapidly, they will retain something of the infantile or immature character."

Rickets, as we all know and recognize, is essentially a child's disease. If in a young female approaching puberty, or at puberty, the general health becomes impaired, in which other structures than bone are equally affected, a question naturally arises whether the same causes acting at a later period of adult life may not so change the health as to produce rickets, and in this way establish "an arrest of growth or development." If such were the case, then rickety pelves in these cases would become cordiform, and not oval.

Respecting the equally faulty or contracted pelvis, it sustains, like the other parts, a normal relation to the size of the body, and according to the development of the sexual organs and the female pelvis in strength, thickness, and texture, and the union of the bones to each other, having the same conformation of the straits and pubic arch, and do not differ from the healthy stature, as the subjects are sometimes taller.

It bears the type of a perfectly well formed normal pelvis. From this circumstance alone it cannot be viewed as an arrest of growth or an immature or infantile pelvis.

It is a singular fact, but nevertheless true, that the influence of the pelvis upon labor was one of the last points to which the obstetricians directed their attention. It is natural to suppose that so frequent and obvious a cause of difficult labor as deformity, greater or lesser, would not have escaped consideration. It is also natural, and absolutely necessary, that a just proportion and relation should exist between the pelvis and the body which is to traverse it. If these proportions do not prevail, and if the pelvic diameters are narrowed beyond a certain limit, there remain but two alternatives, viz.: either to diminish the volume of the child's head or body, or to cause a new outlet for its delivery.

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Before the middle of the last century, there was scarcely any mention made of the subject. Fielding Ould in 1742, Smellie in 1751, were the first to investigate the mechanism of labor, which was further elucidated by Solayres de Renhac in 1771. In 1780, Baudelocque the pupil of Solayres, gave more currency to his preceptor's views, though he did not recognize those relating to the Solayres obliquity of the head. At this period of time, the Sigaultian operation was under discussion (for symphysiotomy).

The discussion respecting the deformities of the pelvis took a wider range, and a more just estimate of this cause of difficult and tedious labor was entertained, erroneous views prevailed in regard to the passage of the child's head through the pelvis, which were of such a nature as to give rise to serious clinical results.

Stein, the nephew, but more especially the older Nägele (in 1822) contributed materially to change these mistaken and erroneous views.

Nägele's future experience and investigation on the obliquely ovate pelvis, as well as on the justo-minor pelvis, gave a new impulse to the study of those deformities which were due to defects in the conformation of the pelvis, but had no relation to constitutional or hereditary disease, as rickets, malacosteon, or scrofula, either of the pelvic region, vertebral column, or general diseases which are so easily and readily recognized in almost every case by prominent and suggestive indications.

Stein was the first to give (in 1825) attention to this subject, and he asserted that the equally contracted pelvis descends less below the normal standard than the pelvis by amplitude rises above it, that is one inch, while the extreme limit of the equally faulty or contracted pelvis does not exceed half an inch.

In 1830, Nägele, the elder, in his comments on this form of pelvis, differed from Stein, and he records in his paper three cases where the female pelvis, affected with this defect, presented no appearances whatever of a rickety change, either in strength, weight, or texture, one of them was even

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heavier than the normal, nor were there any symptoms of rickets in the history.

The diameters of the pelvis were also an inch less than the standard measurement. The ages of these patients were from twenty-three to thirty-two years (showing that the faulty capacity was an adult diminution or lessening) and they were all above the average height.

Two of the patients died after severe instrumental delivery, the third died undelivered of the second conception from rupture of the uterus, and a comparison of the pelvis with the child's head afterwards showed that a living child would have been impossible without the Cesarean section.

Busch, in the *Berlin Lying-in Hospital Reports*, vol. xv., 1837, mentions three cases, two of which terminated fatally. The first was a presentation of the breech, the head was delivered by forceps, the child dead. The pelvis was contracted one-half inch in every diameter.

The second case was a head presentation, the child, delivered by forceps with the greatest efforts, was dead, the mother dying the next day.

The third case required perforation, forceps were first used, with considerable traction, the mother dying soon after. The diameters of the pelvis were found to be three-quarters inch below the normal measurement.

Mr. Lavalade in 1830 reported that a woman died of this form of pelvis at the Marseilles Maternity undelivered. In the Bonn collection there is a pelvis, the antero-posterior diameter of which is three and a half inches. In the cavity antero-posterior, three and seven-eighths, cavity transverse, four and a quarter, child delivered by forceps dead, the mother dying of eclampsia. In the cases reported by Heim, Korman, Spiegelberg, and others both mothers and children were lost. Velpeau's two cases were also lost.

The smallest diameter of any reported case was that of Nägele's patient, aged thirty-one years. The antero-posterior diameter was three inches; cavity, three and a quarter; outlet, three and a sixth. Both mother and child died. This pelvis was perfect in every respect in the sub-pubic arch,

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the sacral curve, and the approximation of the ischia. The only fault was the non-union of the articulations. This pelvis might appropriately be called an immature pelvis.

My colleague Prof. Lusk reports in the *Gynecological Transactions* for 1879 an extremely contracted pelvis having a lessening of one and a quarter inches in the antero-posterior diameter, in the cavity one inch, outlet three quarters inch. The pelvis was of the feminine type, and well formed. There was, however, a slight synostosis of the left sacro-iliac articulation, causing a slight ovate obliquity. The mortality with this form of pelvis, where the diminution of the diameters is from three-quarters to one inch, is exceedingly great. It is as great as in the obliquely ovate, where the Cesarean section is so strongly advocated, and greater than in almost any other deformity of the pelvis.

It is not only in this great diminution in all the diameters that the mortality to the child is recognized, but it is also very marked in the minor degrees of one-third to one-half inch.

The death rate is two-thirds greater than in the simple flat pelvis. According to Löhlein, the fatality to the mother is 6.5 per cent. Litzmann says that in contracted pelves, taken altogether, the death rate is only 2.22 per cent., that is two-thirds less than in the equally contracted pelvis.

From the report of Löhlein, it would appear that this kind of pelvis exists to some extent in Germany.

Possibly some of these cases were affected with some constitutional disease, as rickets prevails more in that country than with us.

I did not, however, meet with it in any of the cases which came under my observation.

To assert that rickets is the true cause of the arrest of development, by producing a want of perfect osseous union between the different pelvic joints, is, from the practical evidence presented, incorrect, and least of all is it the rule.

The immature, and the male or Irish pelvis, as it is sometimes called, is seen frequently among the Bethnal Green weavers of England. John Wood, of London, has recog-

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nized in the dissecting room the frequency of this naturally deformed pelvis. Otto, in Germany, has stated, relative to its frequency, that in one winter he met with forty-five instances in the dissecting room, and that more than half of them should go to the museum. There is, probably, not one of us who has not seen illustrations of these different forms of pelvis.

These types are referred to, and spoken of by some authorities as the same form of pelvis as the equally contracted.

If, however, we examine anatomically these pelves in regard to their structure, texture, and conformation, we find that they are the very reverse. They are as different from the equally faulty as the simple flat, non-rickety is from the immature or funnel shape, which is the very opposite. In the simple flat, the conjugate is the only narrow part. In the immature and male, the conjugate is lengthened, and in the immature may become so long as in some cases to resemble the conjugate of a kyphotic pelvis, $5\frac{1}{2}$ inches. The transverse diameter is narrower in the immature and male, while it is wider in the equally faulty and the simple flat. Physiologically we know that the transverse diameter does not, as a general rule, begin to widen till the period of puberty.

Both the immature and male pelvis become in form, shape, and appearance almost alike, but differ in size and weight, principally from the cartilaginous union of the joints in the immature, and in their premature ossification in the male. They are, therefore, entirely different from the equally faulty or contracted pelvis.

The preponderance of the conjugate—the narrow transverse—the contraction of the sub-pubic arch, and its length —the approximation of the ischial tuberosities, the deeper pelvis, and the narrow and straight sacra in the male—the shallow pelvis and wider arch of the immature, and its want of osseous union, shows the difference.

Now in all these different forms of pelves, although so perfectly distinct from each other, it is especially the cavity of the pelvis and outlet we have obstetrically to deal with, and

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not the conjugate, as in the simple flat, and its capacious cavity.

To recognize the difficulties which exist in this class of pelves, there are important indications to be considered.

1st. The position of the child's head at the superior strait.

2d. The caput succedaneum after the labor has existed some time.

3d. Corroborative proof of the form of pelvis by the shape of the child's head after delivery, if not perforated.

4th. Pelvimetry, external and internal.

The character of the pelvis might possibly in some cases be recognized during the first stage of labor, or, perhaps, not till the cervix was amply dilated, but no positive evidence of the faulty condition could be entertained till labor had progressed. More generally the true nature of the case is not realized till the application of the forceps, when we begin to suspect that either the child's head is too large and well ossified, or that there is some fault or defect in the conformation of the pelvis. It is considered far more difficult to ascertain the measurement of the transverse diameter in the cavity in these pelves, or any pelvis, than the conjugate in the other kinds of deformity. The measurement, it is true, cannot be made with perfect accuracy, but may be made sufficiently close for us to rely on its guidance. The shape and size may be surmised sometimes by the position of the child's head at the brim, and this will have important bearings on the nature or what type of pelvis we have to encounter.

1st. In the simple flat pelvis, the head is at the superior strait, transverse or slightly oblique, presenting by the parietal bone, either anteriorly or posteriorly.

In the immature and masculine, it is antero-posterior, and the occiput presents.

In the equally contracted it may be oblique.

In the normal pelvis, the head is more or less obliquely placed, and the whole vertex may sometimes be felt.

In the equally faulty, at the commencement of labor the occiput may dip and should, as it is the only favorable position for the child's head to enter the cavity of the pelvis, for

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flexion is absolutely necessary, and flexion as far as can be obtained, so that the smallest diameter, the trachelo-bregmatic, may terminate the labor, aided essentially by the flexibility of the bones of the child's head, and by their overlapping each other as far as nature will admit.

Flexion to the same extreme extent is not as requisite in the immature and male, for there is more compensation in the antero-posterior diameter. In the simple flat it is the reverse as far as slight extension of the occiput backwards is necessary for the child's head to clear the promontory of the sacrum, by the temporal bone, as the narrowest or smallest part of the cranium.

Should complete flexion not take place in these faulty pelves, the equally contracted especially, and the forehead dip, a brow presentation will occur, or what is much worse, a face, as happened in the case related.

2d. The scalp tumor by some authorities is considered a favorable indication, as it fixes the head in position at the superior strait. This tumor, however, may become so large and long as to fill the whole of the cavity of the pelvis and reach the vulva, and from its size and tension, feeling firm and solid, it may be mistaken, as it has been, for the osseous structure of the child's head. The tumor is thought to assist in the delivery by compressing in some measure the parietal bones. My own experience, on the contrary, is that it conduces indirectly to impair the soft structures of the mother, and to aid in prolonging the labor.

3d. After delivery, as a corroborative proof of the faulty condition of the pelvis, the cranium of the child, if it is born naturally in either of these kinds of pelves, will indicate the nature of the pelvis we had to deal with.

The present specimen gives an excellent illustration of the equally faulty pelvis. The marked overlapping of the parietal bones over the occipital, frontal, and the smaller bones shows the great amount of compression the child's head has undergone, the strong and powerful action of the uterus that was demanded to complete the delivery, and the round and ball-like appearance of the cranium with its thin and flexible bones.

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The measurements of the diameters of this specimen, as compared with those of an ordinary-sized head, are one inch less in the fronto-mental, three-quarters inch in the biparietal, and one-quarter inch at the base. The pelvis of the mother must have been more than one-half inch less in all diameters than the normal.

In a few instances of the funnel-shape pelvis, I have found that the parietal bones were compressed to two and a half inches by measurement, while the fronto-mental had been elongated seven or eight inches. One of these cases occurred in the wife of a prominent clergyman in this city, and the head has not to this day recovered its natural conformation.

The flexibility of the bones of the child's head is in some instances exceedingly great, and should this condition exist, the child may be delivered naturally, if not, it will have to be sacrificed. I recall an instance of this marked pliability, where the child weighed over eleven pounds. The mother was of very small stature (four feet nine inches). Shortly after delivery, when the child was placed on the pillow, no matter on which side, that side of the head would be flattened, while the other side would retain its natural convex appearance. On removing the child from the pillow, the compressed side would recover its natural contour.

As a general rule it is with primiparæ that we have to deal. In multiparæ, the antecedents of the case will claim our attention, and we can select the proper time for the induction of labor, which I have known to be done at the seventh month.

4th. Pelvimetry. External pelvimetry will be of no value, and internal, either by the single, two, or four-finger methods, gives but negative information in these pelves. The examination by one finger, the usual way, can only be of value when the pelvis at the superior strait is much contracted, and it is then only possible that we may reach just below the promontory.

The two-finger method, by separating the index and middle finger internally, the tip of one finger resting on the

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promontory of the sacrum, and the other behind the pubes, is impracticable.

The four-finger method, as represented with the hand only partly introduced, is also insufficient, and it is only after some experience that such methods of examination can be of any value.

As the cavity of the pelvis is to be measured, and especially the diameter of the transverse, which is recognized as so difficult to obtain, it is necessary for the safety of the mother that the whole hand should be introduced to gain the required information which is to direct the further management of the case. It will depend upon the result of such an investigation whether we determine in a given case in favor of the operation by the forceps, version, craniotomy, the Cesarean section, or its modifications.

The conjugate diameter in these pelves it is not so imperative to ascertain, but, as I said before, it is the cavity of the pelvis, and the inferior strait. When the whole hand is introduced into the cavity, the fingers should be carried above the superior strait, as is done in some cases when we desire to flex the head of the child or to effect version; then place the solid part of the hand in the conjugate diameter. Should the distance or space be longer than the measurement of the hand across the knuckles, the conjugate will be more than three or three and a half inches.

In the same manner, with the fingers partly above the brim, the transverse diameter is ascertained, if necessary, by extending the thumb. Should the hand not come in contact with the sides of the pelvis, the diameter will be more than three and three quarters or four and a half inches.

In a natural, well-formed pelvis, or the simple flat, the hand can be introduced in the cavity, and easily rotated round, without much if any constraint or contact. Both hands must be employed, as the examination by one hand might mislead or leave the impression that there is no contraction or defect of formation of the pelvis.

The laxity of the vagina, as a general rule, and the other soft structures, and the moisture which attends the process

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of labor, will permit generally an easy examination to be made, under chloroform.

This is the method I have adopted in cases of this nature in preference to those methods which I have reviewed, as it yields a more satisfactory and valuable result. The measurements of the outlet in these pelves have been and are frequently overlooked. It is highly important that they should be known, as I have in several instances realized. The most useful, simple, and correct method is that of Breisky, measuring with the compass from one tuberosity of the ischia to the other, the patient being in the dorsal position, with the knees well flexed over the abdomen.

The unfavorable consequences attending the labor if it is prolonged, particularly in the equally faulty, involve the welfare of both mother and child.

From long and continued pressure, without any advance of the labor and with the child's head at the superior strait, most generally an edematous condition of the cervix arises, which may eventually extend to the whole of the vagina, diminishing the capacity of the pelvis so much as almost to preclude an examination, magnifying the difficulty, and preventing the descent of the head, or dilatation of the cervix. Should the head of the child be completely covered by it, and partially engaged in the superior strait, the compression of the cervix by the head against the brim may be so effective and severe as to effect a complete circular amputation. We do not realize this fact till after the delivery of the child and the placenta, when the whole cervix is cast off, measuring from two and a half to three and a half inches. I have seen three cases of this nature. Sometimes there is only a partial amputation of the cervix.

Reversely, a trismus of the organ may ensue and become persistent, the cervix having receded or retracted over the child's head, a stretching and thinning of the vagina ensues, exposing that part to laceration, or from the expansion of the isthmus, by the child's head, consequently on the non-dilatation of the internal os uteri, a thinning of the structure follows, and a rupture may take place. The upper part of

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the isthmus is the true muscular structure and is erroneously called Bandl's ring.

Indirectly a paresis may arise, and flooding follow, or a low grade of inflammation is lighted up, inducing a partial or complete sloughing of the vagina. The patient may collapse suddenly from shock, in consequence of the delay in the delivery, as in the case related.

These unfortunate and unfavorable symptoms may not ensue, provided the delivery is accomplished early. In a number of cases which have come under my observation, although the child was destroyed, the mother has fortunately progressed favorably, when the diameters were from one-quarter to one-third inch. In these cases, I have recognized that the occipito-posterior presentation prevailed more frequently than in well-formed natural pelves, and that the head of the child never made any rotation anteriorly, nor could. The left existed more than the right.

Treatment.—Considering the unfavorable aspect and the great loss of life to the mother in the equally contracted pelvis when the diminution is from three-fourths to one inch, and the total loss of life to the child (even when but a minor degree of lessening is recognized, or from one-third to one-half inch) by instrumental delivery (craniotomy and cephalotripsy), and the strong probability, should the labor be allowed to reach twenty-four or thirty-six hours, that the mother will also become a victim, it may be even after delivery—with these disastrous results from the usually adopted and sanctioned method of treating such cases, can we justly and conscientiously sanction the continuance of such a course? It is my belief, from the experience of many years, that the Cesarean section, some of its modifications, or symphysiotomy, even in the minor degree of one-half inch, should be adopted and sustained, as often as they are in the simple flat rickety or non-rickety pelves of two and one-half inches, or even three inches, in the antero-posterior diameter.

In the higher grades of contraction (three-fourths to one inch), the Cesarean operation has only now and then been performed. Craniotomy and cephalotripsy have been and

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still are continued as the rule. A more disastrous presentation, by either of these operations, could not exist! Without the recognition of the exact state of the pelvis, the operator will only realize, when he comes to operate, that the delivery by cephalotripsy and craniotomy cannot be accomplished as easy as in a standard pelvis, but that it will require considerable time and expenditure of physical strength. The different instruments that are called for, and the great amount of patience that is needed, even though the head of the child may have been mutilated considerably, is great. The force that is used is spent almost unprofitably. It is a pure mechanical and physical display of power, possibly eventually to succeed. There is, however, a limit to both force and time, and that limit can only be recognized by experience, not by any fixed rule.

The treatment in regard to deformities of the pelvis in this city is more usually considered in relation to the simple flat pelvis. Rarely are other deformities seen or operated on.

In the ordinary simple flat non-rickety pelvis, which we notice in this city, the contraction is seldom, where no disease exists or has existed, below three to three and one-fourth inches, and the faulty condition is only in the conjugate, the cavity being ample. Version is more generally resorted to than the forceps, and as a rule the obstruction can be overcome after a short time, with the assistance of firm, decided, and steady pressure on the head by the hand over the pubis. The child can then usually be delivered as easily as through a normal pelvis, but if not, the after-coming head may be relieved by the forceps.

In the equally faulty or contracted pelvis, version is almost impracticable, and if resorted to, the mechanical efforts to deliver the child will be far greater than by the forceps, unless craniotomy has been performed previously. Should craniotomy have been performed, then version may possibly succeed. It has not in some of the cases I have seen, and it totally failed in the case related.

Much as I have advocated craniotomy in preference to the

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Cesarean section, in the simple flat pelvis, in my former papers on craniotomy and cephalotripsy, I am constrained to believe that one of the external operations, as the Cesarean section, or laparo-elytrotomy, early performed, or symphysiotomy, when the labor is more advanced and the head wedged in the cavity, should be selected. The election of either of these methods will be dictated by the nature of the case, the condition of the patient, and the views of the operator. Each of them has its own special sphere of action. Although the two last were suggested and practised many years since, they had almost passed into desuetude, and were considered as impracticable. Fortunately, they have been resuscitated (the Sigaultian operation by Profs. Morisani and Novi, of Naples, in 1866; the laparo-elytrotomy of Ritgen and Baudelocque by Prof. Thomas, of New York, in 1870; and the cervico-pubic laparotomy of Physick, of Philadelphia, by Kehrer, of Heidelberg, in 1880). They have it the present day again become new resources which are to enrich and benefit our art. They are operations, nevertheless, which are attended with their own peculiar applications, advantages, and dangers, but which at least may render craniotomy and cephalotripsy more rarely necessary. I do not believe they will supersede the classical Cesarean section, especially when we take into account the more recent and improved methods and means for conducting that operation.

The Porro operation, or its modifications, is inadmissible in this form of pelves. Laparo-elytrotomy or the cervico-pubic operation are also contraindicated, should the head of the child have become arrested in the cavity of the pelvis. Symphysiotomy as an operation is more especially for the benefit and safety of the child. It is not recommended in pelves of less than two and three-fourths or three inches, or that are much diseased. Although symphysiotomy has received bitter denunciation, yet, while Gerard and others regarded it as useless, Velpeau, with others, considers it as the only means of safety that could be adopted. It is particularly applicable to the class of pelves I have considered, and

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especially to the equally contracted, presenting features for acceptance, in so far as the child is concerned, in preference to the others. Roederer, the celebrated Hollandish obstetrician, considered that at some future day it would be advantageously resorted to. In the Neapolitan hospitals, during the last sixteen years, Dr. Harris informs us that fifty-three operations were done with a saving of forty-three women and forty-two children. This is a result equal to that of the early performed Cesarean section under favorable circumstances. Five of these were of the faulty type. It has been alleged by the antagonists of the operation that, after the division of the symphysis, and when that joint was opened to the extent of three inches, without impairing or injuring the sacro-iliac joint, only three or four lines at most could be gained. This, however, is an incorrect and one-sided view of the subject and only a partial consideration of the benefit of the operation. It is conceded that the separation of the pubic arch gives only three or four lines of advantage to the antero-posterior diameter, the chief gain being in the transverse and the oblique diameters, which are increased to the extent of one inch each for the cavity and inferior strait. This important, highly valuable, and appropriate enlargement of the cavity of the pelvis has been by many overlooked, they having confined their views of the subject simply to the lengthening of the conjugate, and not to the amplification of the cavity. This amplification is precisely what is required to permit the natural delivery of the child in this class of pelves, and if this is not accomplished soon, we can apply the forceps. From these considerations, respecting the different external operations, we are led to accept either the early performed Cesarean section, or symphysiotomy, should the child's head be arrested in the cavity of the pelvis. If it is not, then either laparo-elytrotomy or the Cesarean operation.

I regretted very much, even after I had progressed some way with the delivery of the child in *this* case, that I had not performed either of these operations, as the head was at the superior strait; but as the internal soft structures ap-

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peared so much swollen, and the patient so exhausted by the length of time the labor had existed, I continued with the operation related.

In the two last cases I attended, one with my friend, Dr. C. C. Lee, the defect of the pelvis was in the inferior strait, which measured two and one-quarter inches, and which was, as was afterwards learned, consequent on some previous disease of the hip-joint. The labor had continued several hours, and the child was living. The child might have been saved. The patient died on the third or fourth day from pulmonary edema.

It is a correct, true, and practical remark of John Clark's, "That the head of the child cannot pass entire when the diameter of the pelvis is under three and a quarter inches, and even then it will require the perforator." If this is true, and there can be no question or doubt about it, how then could we expect a head of ordinary dimensions to pass through a diminished or contracted pelvis when equally faulty in all its diameters of one-third to one-half inch? Rotation of the child's head, especially if it is an occipito-posterior presentation, cannot possibly take place in the cavity of the pelvis, as there is not *compensation* enough in the pelvic diameters to admit of it, unless the child's head has been moulded to fit, as in the specimen exhibited.

It is the same with the immature and male pelvis; though different in conformation, the head will, in some cases, descend considerably into the cavity, and become firmly arrested. There is, however, not so much difficulty in the delivery when instruments are required. If craniotomy is done, the brain evacuated, and the head tilted sideways to allow the base to come through, the inferior strait may be lessened to only one and three-quarters to two inches.

Considering the great progress abdominal surgery has made during the last few years, I would not forget the dangers to the mother which will and must surely follow from an improper delay in terminating the labor. For every hour the labor is extended, the vitality of the mother is lessened, till it is finally extinguished.

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Should another instance such as I have related, and where the narrowness or faulty state of the pelvis is from one-third to one-half inch, and where there is no prospect of the delivery being accomplished naturally, I would hold myself obligated, with the views I have expressed, to advise the selection of one of the external operations referred to in preference to that of craniotomy or cephalotripsy. I am impressed with this belief after considerable reflection that in these types of defective and faulty pelves it would be less hazardous and accomplished sooner; that we would feel the gratification of having a living child, as well as greater hope for the life of the mother, than would the prolonged, wearisome, tedious, and trying operation by cephalotripsy.

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ANTEFLEXION OF THE UTERUS. ITS ETIOLOGY AND ASSOCIATED PATHOLOGICAL CONDITION.

By W. GILL WYLIE, M.D.

I. AN OUTLINE OF THE ANATOMY OF THE POSITION AND SURROUNDINGS OF A HEALTHY UTERUS.

A NORMAL uterus is a decidedly firm fibro-muscular body, about three inches in length and about two inches at its widest part; is pear-shaped, tapering down to a little below its middle, where it is smaller than at any other point. From this point down it is about one inch wide. It is somewhat flattened antero-posteriorly, the posterior surface being more convex than the anterior. Running lengthwise through it is a small flattened tube, somewhat constricted at its centre and widening above.

The average depth of this channel is a little over two and a half inches. The uterus is to a considerable degree flexible and elastic, and when pressure is made on the fundus or upper portion, it bends chiefly at a point a little below its middle, just opposite the constricted part of the lining membrane known as the os internum, or isthmus. On account of the solid and elastic nature of the organ, it does not bend sharply, making the central, normally flattened tube form an acute angle, nor can it be fairly compared to the bending of a rubber tube with a relatively large lumen, of which the concave side then forms an acute angle, and totally occludes

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the canal at the point of curvature. It bends with a curve such as would be made by a rubber tube with very thick walls and small lumen.

Even when bent extremely, the canal describes a parabolic curve. Where the walls are very much thinned and the cavity distended, the anterior wall may make a flexion, somewhat like that of a tube of large calibre and thin walls, but such cases are rare. When uninfluenced by congestion or erection, the normal uterus is held suspended nearly in the centre of the pelvic cavity, the axis of which crosses the long axis of the uterus just below its middle. The centre of the lower end of the uterus, the cervix, is somewhat posterior, and the centre of the superior end, the fundus, is a little anterior to the curve known as the axis of the pelvis. The top of the fundus is somewhat below the brim of the pelvis, and the cervix is below and behind the centre of the pelvic cavity.

The uterus is held in position chiefly by the fasciæ and connective tissues of the pelvis, and by the reflections of the peritoneum, which, together with the fasciæ and connective tissues, form more or less distinct ligaments: Utero-sacral, utero-vesical, and broad or lateral ligaments. In all of these there is more or less muscular tissue, aud they are curved and so elastic as to permit of considerable mobility of the uterus as a whole, especially upward and downward, and backward and forward. All of these ligaments have their attachments to the uterus below its middle, except the lateral or broad ligaments, which, covering it anteriorly or posteriorly, project from its sides and attach it to the pelvis in such a way as to give it a forward inclination, and the round ligaments which tend to prevent its extreme backward displacement, and when contracted draw the uterus forward.

The connective tissue, usually termed cellular tissue, by its vast quantity and disposition, not only helps greatly to strengthen the pelvic floor and retain the uterus in position, but on account of its network structure, it also allows free elastic motion to all the pelvic contents, and, together with the immense number and size of the blood-vessels, renders

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the contents of the pelvis so mobile and elastic in character as to give them a power of adaptability not very different from that of blood or water.

The elastic contractility of the muscles and connective tissues—that is, the heart, the muscles of the arteries, the muscles of the ligaments, perineum and abdomen, the connective tissue of the skin, abdominal and perineal walls of the ligaments, the fasciæ and so-called cellular tissue of the pelvis—unitedly have an influence which I will term the vital musculo-connective-tissue force.

The connective tissue and certain muscles, by their cohesive and contractile strength, prevent undue relaxation and displacement, while their structure and disposition admit of motion. And the adjustable pressure of the abdominal and arterial vessels, together with the heart's action, keeps up an ever varying but more or less equable pressure.

2. THE DYNAMICS OF THE PELVIC CAVITY, OR THE INFLUENCE OF FORCES IN CAUSING ANTEFLEXION.

The influence of the atmosphere, although universal in exerting pressure on all things on the earth's surface, has little to do with keeping the pelvic organs in place by opposing gravity. If this force is to act as a retentive power by counteracting gravity, the vessel must be rigid and fixed above as well as on the sides and impermeable to air. So far as the retention of the pelvic and abdominal organs is concerned, atmospheric pressure, by opposing gravity, helps to retain only those organs which, when the diaphragm is arched upward, lie beneath the ribs, as the liver and stomach, and it only acts in this way on them when the ribs and diaphragm are made rigid by muscular contraction, as in holding the breath. This is why we hold our breath when falling or in jumping. It does not act in the same way on the pelvic organs, for the abdominal walls can be made rigid only by the downward action of the diaphragm, and thus the vessel has a piston acting downward and tending to drive out instead of tending retain the organs in place, by keeping off downward pressure.

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Gravity acts upon the contents of the pelvis as it does upon the semi-solid, elastic, and mobile contents of a rigid cylinder with a flexible bottom, the top of which opens into another flexible cylinder, also filled with an elastic ever-changing mass, falling and rising at all times with more or less force.

If the perfectly normal uterus in a healthy nulliparous woman has a natural anterior inclination and also a slight natural anterior curvature, and if it is so suspended in the pelvis that it is free to bend forward at or above its middle without resistance so far as the ligaments are concerned, except perhaps, the slight restraint exercised by the upper borders of the broad ligaments, we may ask:

What is it that prevents a normal uterus from bending forward at or above its middle when the person stands erect or when it is pressed upon by the action of the diaphragm, the abdominal muscles, etc.?

1. The firm and elastic nature of the tissues of the uterus permits of motion, but tends to preserve its normal shape.

2. The forward inclination and slight anterior curvature of the normal uterus puts it in the best possible position to enable it to withstand both continued and sudden waves of force from the action of the diaphragm and the abdominal muscles. When standing or sitting erect, the pelvis of a normally formed woman is carried backward, so that a plumb-line dropped from the front of the soft tissues covering the first or second lumbar vertebra will pass through or in front of the os pubis. When standing erect, as the central part of the spine curves forward, the sacrum and coccyx are carried backward, and the floor of the pelvis is made more taut and firm than when the abdominal muscles are relaxed and the spine is straightened as it is in the squatting or reclining postures. Postures that make tense the abdominal muscles also make tense the floor of the pelvis, and those that relax the floor of the pelvis also relax the abdominal walls.

If we represent the abdominal and pelvic cavities by cylinders, the axis of one is not continuous with the other, but

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they form an obtuse angle of 160° or more to each other; thus, as the wave of motion caused by the diaphragm passes directly downward, it passes through the mass of intestines, and as they are attached and fixed posteriorly, they deflect the wave somewhat forward and downward on the elastic anterior abdominal walls, and from there it is deflected backward and downward into the pelvis, and is thereby very much modified when it reaches the uterus. Now, if the long axis of the uterus is perpendicular to the plane of the pelvic brim, or better, if it is somewhat anterior to the pelvic axis, the deflected and modified wave would strike the very top of the fundus, and glide over and around it, and spend its remaining force chiefly on the floor of the pelvis. Of course, blows upon, or force produced by sudden contraction of the abdominal wall would pass backward and be received in the same way. Old men who have difficulty in urinating, bend the body forward, not only to relax the perineum and pelvic floor, but also to carry backward the abdominal wall, keep it rigid by voluntary contraction, and thus transmit directly the force of the diaphragm on the bladder, and for the same reason, when one strains at stool, he leans very much forward, so as to direct this force directly backward on the rectum.

Postures, therefore, which tend to make the pelvic cavity a direct continuation of the abdominal cavity may be injurious by bringing the uterus directly under the diaphragm; but it must not be forgotten that as long as the uterus retains its position and normal relations to the pelvic brim, it is in the best possible position to receive waves of force coming into the pelvis; for as the pelvis is turned up, the uterus is also lifted, and when the brim of the pelvis is directly under the diaphragm, the long axis of the uterus is directed against the downward motion. Besides, when sitting at ease, as the free borders of the ribs approach the pelvis, the abdominal walls are relaxed, and thus much of the force of the diaphragm is dissipated, being expended mainly on the relaxed abdominal wall anterior to the pubis. As the spine is straightened the pelvic floor is relaxed, and the

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mobility of all the organs is very much increased, and they offer but very little resistance to being carried backward against the rectum. This is why we can best examine the pelvic organs with the patient on her back, with legs flexed and backbone straightened out, on a flat table; but we must not be deceived by taking it for granted that the uterus is equally movable in all other postures.

Again, any work which requires more or less rigidity of the body, and thereby necessitates tension of the abdominal muscles in the sitting posture, may be very injurious—*e.g.*, working a sewing machine with the body inclined forward, etc. A tightly-laced woman usually sits erect, for in that position she is most comfortable. It is surprising how few anatomists can give a correct answer to the question as to where a plumb-line dropped from the anterior surface of the second lumbar vertebra will intersect the pelvis. Writers who ignore this special relation of the pelvic to the abdominal cavity, naturally overestimate the mechanical influence and power of pressure from above on the uterus.

3. FLEXION IS PREVENTED BY THE VITAL MUSCULO-CONNECTIVE-TISSUE FORCE,

Or the sustaining power of the surrounding flexible, elastic, and adjustable tissues which during life are filled with blood, fluids, gases, etc. These are all kept closely packed by the blood pressure and the elastic contractility of the skin, muscles, fasciæ, and connective tissues that make up the floor of the pelvis and the abdominal walls. This force is always more or less active, and when the abdominal muscles are tense, it is one of great power, and not only helps to keep the organs in place, but regulates the pressure on the numerous blood-vessels and intestines of the abdomen, and, when opening the abdomen, some of the shock, so frequently observed when a part of this pressure is removed, may be due to the great disturbance to the circulation caused by removing this pressure from the walls of all these vessels. When standing erect, the central part of the spine bends forward, the ends bend backward, and the abdominal and perineal

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muscles are made tense so as to give power to counteract the downward force of gravity by bringing into full play this sustaining force. So important is this influence that it cannot be left out when considering the dynamics of the pelvic cavity.

In studying the influence of indirect pressure, such as is made by the diaphragm, abdominal muscles, blows, falls, etc., in fact all pressure except that made directly by solid bodies in contact with the uterus, we must regard the pelvis as a cylinder with an elastic top and bottom, filled with fluid or rather a mass of tissues filled with blood, fluids, and gases, and so elastic and mobile as to transmit force, and be goverened by very much the same laws as though it were fluid. A great part of this mass is composed of innumerable elastic intercommunicating tubes (blood-vessels). Therefore, when the floor of the pelvis is tense, force applied from above on the elastic abdomen, or from the diaphragm, is transmitted more or less equally to all parts of the pelvis, in front, behind, and around the uterus, with as much or nearly as much power as on the top of the uterus. And while the uterus is surrounded by these elastic and adjustable tissues in the living body, it is in a measure sustained in the same way as a flexible sea-weed is when surrounded by water. In other words, the weight of the fundus tending to fall forward and bend the uterus on itself is very much less than it would be out of the pelvis. The acting force of gravity to flex the uterus would be the weight of the uterus minus the average weight of the contents of the pelvis.

Advocates of the mechanical pathology of uterine displacements have overlooked this influence, which greatly modifies all indirect forces acting on the pelvic organs, and have, therefore, exaggerated the effects of falls and sudden efforts in producing anteflexion, and are naturally led to rely too much upon mechanical support toward effecting a cure. Of course, the effect of downward pressure, when very sudden, as in the act of coughing, although much modified by first impinging on the elastic abdominal walls, would for a moment flex the uterus to some extent before the wave of motion

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would have time to reach the floor of the pelvis, or be evenly distributed; but the natural elasticity of the uterus and the surrounding tissues would cause it to rebound and in a moment resume its normal degree of curvature, and this would be the case even though the pressure from above were made continuous, as in lifting, straining at stool, or lacing. Destroy this elasticity and mobility, either by relaxing the supports so that the uterus rests against the unyielding pelvis, or by shortening or condensing the ligaments or surrounding tissues, and then, in addition to disturbed circulation, the slightest force may have a baneful influence.

Constant pressure, such as is caused by lacing, undoubtedly tends to force the floor of the pelvis down, and in delicate women where the muscles and fasciæ are soft, flabby, and wanting in vitality or tone, the uterus may be carried down so low, together with the floor of the pelvis, as to flatten and bend forward the cervix on the body. Lacing interferes with the normal action of the abdominal muscles and the vital musculo-connective tissue force generally.

The effect of downward pressure on the healthy uterus, therefore, tends to produce general prolapse rather than anteflexion.

When a uterus is soft, what causes it to become flexed when the person is erect, or when there is downward pressure produced by the action of the diaphragm and abdominal muscles?

1st. The normal position of the uterus is one of anterior curvature, and on this account the weight of fundus, less the average weight of the contents of the pelvis, would tend to increase the normal anterior curvature, if the tissues are soft.

2d. Pressure from above tends to general prolapse of the whole of the pelvic floor, but since the pouch of Douglas and the bladder are the least resisting, or perhaps I should say are the most elastic parts of the pelvic floor, these two points would be the first to yield. Descent of Douglas' pouch would make taut the utero-sacral ligaments that are attached to the uterus just at and above the vaginal junc-

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tion posteriorly; and therefore, until they give way, they would hold upward and backward this particular part of the uterus, while the distention of Douglas' pouch would push down the abnormally soft cervix in the direction of the vaginal axis. At the same time, the utero-vesical ligaments, having their attachments to the pelvis below and in front, would be made taut only at their higher points of attachment to the uterus, and as this is somewhat above the point of attachment of the opposing utero-sacral ligaments, the upper part or fundus of the uterus would be pulled downward on the bladder. Therefore, if these forces were to act on a soft uterus, we would have anteflexion, but were they to act on a firm and resisting uterus, we would have either anteversion or retroversion, according to the degree which Douglas' pouch is displaced, compared with the extent to which the bladder gives way.

3d. Although I do not accept all of Hart's views as to the floor of the pelvis being divided into two segments, still, if he will allow me to prolong or attach his anterior and superior segment to the posterior wall of the pelvis, by the utero-sacral ligaments, and to extend or attach his inferior and posterior segment to the os pubis, by the fasciæ and the pubo-coccygeal muscle, I will accept his statement that for the uterus to escape out of the pelvis through the valvular overlapping opening, the border of the anterior segment must be pushed forward and the posterior segment displaced downward and backward.

Now, as the vaginal portion of the cervix is below the anterior segment and is just above the posterior segment, it is easy to understand why the uterus becomes anteflexed when soft, or retroverted when firm, as it is either pulled or pushed out of the pelvis. The soft cervix is pressed forward and crushed between the upper and lower segments, while the fundus is crowded forward, or falls backward, as the upper segment sinks lower in the pelvis.

4th. The loss to a greater or less extent of the vital musculo-connective force—that is, feeble circulation, weak and flabby muscles, overstretched, relaxed, contracted, or other-

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wise abnormal fascias and connective-tissue, etc.—so frequently associated with and due to the same general causes. Of course, besides the softening of the uterus, other pathological changes, such as local atrophy of the walls, would greatly change and modify the influence of mechanical forces acting on the uterus; but of this we shall speak later.

Downward pressure from the abdominal muscles may tend first to produce some exaggeration of the normal anterior inclination and curvature; yet, as a rule, in the otherwise normal uterus, prolapse beyond a certain extent will produce retroversion, for after a limited amount of descent the cervix is forced forward by direct contact with the curved tissues behind it, and, unless it bends, which it is not likely to do if normal, the fundus must go backward. Backward displacements are of much greater importance, pathologically, than anterior displacements;

First, because the degree of rotation of the uterine axis from its normal position is so much greater; and

Second, the broadside of the organ receives, with more direct and greater force, all downward pressure, for in retroversion the long axis of the uterus is parallel with the plane of the pelvic brim.

Third, the circulation may be not only greatly interfered with by the greater degree of rotation, but the converging ends of the utero-sacral ligament may strangulate the veins where they pass from the uterus on its sides.

Fourth, the uterus is abnormally fixed in the pelvis, and its mobility is in a great measure lost, and with it the normal action of the vital musculo-connective-tissue force is also in a measure lost.

INFLUENCE OF THE BLADDER ON THE POSITION OF THE UTERUS.

In making examinations for uterine disease, the bladder rarely gives any perceptible trouble, and except when nearly full or rather considerably distended, one could not ascertain by bimanual examination that there is any water in the bladder. It is a soft and very elastic organ, and, except at its

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base, is free to move in all directions so far as its attachments are concerned. Except when considerably distended, it has little or no influence in changing either the shape or the position of the uterus. When greatly distended, it acts as a more or less fixed solid and firm body, and carries the uterus backward, and may tend also to straighten out any anterior curvature. When partly filled, or when not distended, it yields to pressure in any direction, and merely goes to make up a part of the flexible and adjustable mass that surrounds and supports the fundus uteri. Of course, there is never a vacuum in the pelvis during life, for the elastic abdominal walls, by contraction or distention, make up for either loss or gain, and therefore, when the bladder is emptied, the space is readily filled up by the surrounding tissue.

THE INFLUENCE OF THE RECTUM ON THE UTERUS.

The rectum, when empty, or only slightly distended, is also a movable or elastic body that helps to make up the adjustable mass of tissues of the pelvis. When greatly distended, it pushes the cervix uteri to one side, and if it is not habitually distended has but little influence on a normal uterus. But when habitually distended, especially its lower part, it greatly interferes with the normal circulation in the pelvis, and by its distention and pressure stretches the pelvic fasciæ and uterine ligaments to such an extent, that more or less prolapse of the uterus occurs; and when the uterus is soft, it tends to produce flexion of the cervix. Besides producing distention and relaxation of the pelvic floor, an impacted rectum is nearly always associated with voluntary straining at stool, which, together with the relaxed and feeble connective tissue, the soft and flabby muscles, and the weak and stagnant circulation so common in such cases, will invariably induce either anteflexion, or more frequently retroversion and retroflexion.

Some cases which I have seen lead me to believe that the tissues which sustain the rectum may stretch and allow prolapse, not only of the lower end of the rectum, but of the

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upper end also; that the sigmoid flexure and the lower end of the descending colon may prolapse, and when distended with fæces help to relax the left broad ligament. This, in some cases, may account for the fact that the left ovary and Fallopian tube are so commonly displaced backward; the tube and ovary falling backward and downward as the intestine is emptied. Besides, the impacted fæces may compress and obstruct the veins from the left pampiniform plexus, and thus cause congestion and sagging of the ovary and tube on the left side, so common in women habitually constipated.

THE POINT OF GREATEST CURVATURE IN ANTEFLEXION.

The exact location of the point of greatest curvature in an anteflected uterus is often very difficult to determine. As a rule, it is just about the os internum: first, because at this point the uterus is slightly smaller than at any other point; second, it is at this point where the cervix and corpus unite, two bodies somewhat different in structure; third, at about this point the large blood-vessels enter and leave the uterus, and thus tend to weaken the walls somewhat; fourth, because just at and above the os internum the uterus is free, while the cervix, just below this point, is comparatively fixed by a firm supporting ring formed in front by the attachment of the utero-vesical, and posteriorly by that of the utero-sacral ligaments. Flexion may take place either above or below the os internum. When the vaginal part of the cervix is abnormally long, or large and soft, it in time becomes bent forward, and the flexion may be found at the vaginal junction. Where there is flexion of the body, or the caving in of one cornu, it is the result of local atrophy or extreme dilatation and thinning of the uterine walls, perhaps flexed or distorted by peritoneal adhesions.

TIME OF MAKING EXAMINATIONS.

The time of making examinations to decide the exact degree of flexion should be carefully considered, for without doubt the amount of curvature will vary at different times; for instance, just before and after menstruation. The best

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time would be during one or two weeks between the menses, when the uterus is usually quiet. If the uterus is an erectile organ, then erotic excitement, by engorging the blood-vessels, might tend to straighten the uterus. If some authorities are right about the function of the round ligaments, the uterus would be displaced forward during erection.

Special conditions of the nervous system would probably have some effect on the shape of the uterus; for instance, when influenced by fear or intense mental excitement, a part of it may be shrivelled up, as the penis of a youth is when being examined the first time for venereal disease.

VARIABILITY OF THE GENERATIVE ORGANS.

All gynecologists must have observed how greatly the features of the external organs of generation vary in different races and in different individuals. The depth of the perineum, the distance of the clitoris from the meatus urinarius, etc., are all variable, and the length and shape of the labia are as diverse as those of the nose. I am certain that this normal variability characterizes the internal organs as well, and on this account we cannot exactly lay down the law as to what will be the curve of the uterus. Because a woman is round shouldered and has soft muscles we have not sufficient ground for pronouncing her abnormally shaped, and to be best treated by braces; and when the uterus is not found of the exact shape of an absolutely perfectly formed uterus we have not sufficient grounds for pronouncing it a case of pathological curvature to be cured by artificial support.

FREQUENCY AND DEGREE OF ANTEFLEXION.

It is a fact that, in the nulliparous women which a gynecologist examines, the uterus may be called abnormally flexed in a very large percentage; but in deciding what the normal curvature is, it must not be forgotten that almost all of these women come to be examined because they have uterine disease, and the condition of their uteri cannot fairly be used in estimating the normal standard.

All nulliparous women have some degree of anterior cur-

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vature of the uterus, and this may vary from ten to thirty degrees without denoting an abnormal condition. That is, while the uterus is quiescent and uninfluenced by congestion, etc., the angle made by the junction of the two lines drawn, one in the direction of the axis of the cervical canal, and the other in that of the canal of the body, might vary from an angle of one hundred and sixty-five to one hundred and thirty-five without being an abnormal curvature; when it exceeds this or is most of the time found less than one hundred and thirty-five degrees, it may fairly be called abnormal.

ETIOLOGY.

Congenital influences which prevent perfect development of the organs of generation greatly predispose to anteflexion of the uterus, and undoubtedly have much to do with the premature atrophy and degeneration so frequently associated with it.

In the working of the law of the "survival of the fittest," the organs of generation play an important rôle. It is a merciful law which prematurely atrophies the generative organs of the degenerate, and thus puts an end to their reproduction in offspring. The prevalence in a community of congenitally anteflexed uteri, or, to speak more accurately, imperfectly developed anteflexed uteri, may be one of the first indications of race degeneration. The functions of the generative organs are not a necessity in the physical organization of the individual. They do not bear the same relations to the existence of the individuals as do the heart, liver, stomach, kidneys, etc. Life can go on in the individual without them. They are the last to develop; therefore they are most likely to suffer from imperfect development and degeneration when the supply of vitality is below par. Their full and proper development would seem to depend upon a surplus of vitality.

In civilized communities, especially among the well-to-do classes, the law of the survival of the fittest is greatly interfered with by the protection afforded to many of those with faulty constitutions. This causes many feeble organizations

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to reach puberty which otherwise would have died in childhood.

Women, more than men, are debilitated by the enervating influence of modern life—want of healthy exercise and fresh air, etc. Besides, they are equally influenced by the general tendency to develop the intellectual faculties at the expense of the physical health, and in this way the somewhat extraneous organs of generation are the first to suffer. Again, in civilized communities, the functions of these organs are kept under restraint; that is, women marry late in life, and when this is the case for several generations, this enforced restraint (disuse) of an organ may have a decided influence toward causing degeneration or atrophy. The average highly civilized woman does not bear enough children to keep up by use the full development of the uterus, and thereby a normal relation with the other organs of the individual.

Much is done to avoid having children, and many women have none or only one or two. In the majority of cases, the functions of these organs are perverted and abused, or they are kept greatly under restraint. Exercise, use, work, call it what you like, performance of function, is essential to the perfectly normal life of all organisms and their organs, and the violation of this great law by disuse results in degeneration.

Menstruation may have been intended by the Creator to take the place of the free exercise of the functions of these organs, and thus compensate for the restraint and disuse so much and so necessarily practiced by civilized races. It seems to regenerate a part at least of the uterus. This may also account for the almost constant muscular contractions which have lately been described as taking place in the uterus.

In a woman having a deformed pelvis, or in other respects showing imperfect development, we usually find an abnormally small uterus, which is, as a rule, anteflexed; but not infrequently we find a well-formed and fully-developed uterus in a small and delicate woman. Sometimes we find a strong and vigorous woman with a small, imperfectly-developed anteflexed uterus, and most of these come to be examined

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because they are sterile, and not on account of dysmenorrhea, etc. Imperfect development, and certainly premature degeneration, is the penalty of violating natural laws. Yet some of the above may be explained by saying that this may be the way that Nature takes to limit somewhat the too rapid reproduction of the race as it becomes more capable of self-protection; for the greater the intellectual standard of a community the less the number of children born. My observations made in the past twelve years lead me to believe that the more refined the intellectual development the weaker the normal venereal desire is, among women at any rate. It is very commonly absent, and when existing it is frequently abnormal. Among the working class it is more common and usually normal, and is kept under control by physical labor. Excessive physical labor subdues, but does not crush it out like excessive intellectual development. This may be explained by the fact that physical work does not, like mental work, tend so much to injure the nervous system, and by the fact that the latter is so often associated with an enervating sedentary life.

Before puberty, the uterus is soft and relatively long, and in early childhood the cervix is considerably larger than the body of the uterus. In children, after death, the uterus is so frequently found anteflexed that some good authorities believe that to be the normal position of that organ before puberty, and that if development is normal, at the age of maturity it will have grown larger and become straightened. If the living uterus of childhood is in the same position as it is commonly found after death, then all that is necessary in most instances to account for the occurrence of small anteflexed uteri is to find the cause of the failure to develop, or that which arrests complete normal development when once begun. This may be due to hereditary influences directly affecting the generative organs, or it may be due to want of harmonious development, the effect of bad general health or bad educational influences, or to bad hygienic conditions. Perhaps most cases are due to several of these influences combined.

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The condition of the general health has much influence on the development and position of the uterus. Bad general condition of the blood; anemia; stunted growth due to poor or imperfect food; want of fresh air, healthy work and exercise; excessive or unhealthy development of the nervous system; fevers, etc., especially any cause which draws excessively upon or weakens the blood or nerves during the period of development from ten to eighteen years of age, greatly predispose to anteflexion. Many of the cases classed as congenital are undoubtedly merely flexions made permanent before maturity is reached. Of children born of healthy parents, few reach full development in perfect health; and just as the greater number have more or less chronic catarrhal disease of the pharynx, so also have they more or less leucorrhea, due either to a partial degeneration or catarrhal state of the mucous membrane of the uterus.

Many have what we call slight granular erosion of the os uteri; in others, this degenerate state of the mucous lining extends to the os internum and uterine cavity, and the uterus gradually becomes flabby—if it has ever developed—and flexed, and the nerves of the membrane at points become hyperesthetic, etc.

In those who inherit or acquire a rheumatic diathesis, or a tendency to catarrhal disease (scrofula), exposure to malarial poison or to cold may induce endometritis, and finally lead to anterior displacement. Anything that weakens or softens the uterine walls may cause anteflexion; and anything that increases the size of the uterus tends to produce, or at least to increase, anteversion.

Child-bearing is usually enumerated as a predisposing cause of anteflexion, but I prefer to say that too frequent child-bearing or an abnormal labor or puerperal state or labor in an unhealthy woman may result in anteflexion. Child-bearing is as truly a natural act as eating, yet one would hardly be justified in saying that eating predisposes to indigestion. During pregnancy, as the uterus enlarges, it is anteverted, but when so in an otherwise healthy woman, it cannot be considered abnormal.

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The enlarged state of the uterus soon after labor, together with the relaxed condition of the ligaments, causes anteversion, and if the patient is imprudent in getting up too soon, the anteversion may be made permanent, or, on account of the softened state of the uterine walls, anteflexion may result.

Subinvolution of the uterus or ligaments may end in anterior displacements. An enlarged, hard, and anteverted uterus is characteristic of old subinvolution, and it is not uncommon to find a small fundus bent sharply forward on a large subinvoluted cervix, or the large soft cervix bent forward in the vagina. Uneven or unequal involution may thus cause an anterior displacement in the same way as unequal development. Specific vaginitis extending to the endometrium, by enlarging the uterus, causes anteversion and may finally result in anteflexion. Inflammation extending to the parametrium, especially pelvic peritonitis, may, by the contraction of ligaments, or adhesion, result in anterior displacement, but, as a rule, it causes lateral or posterior displacements. Unequal development of the walls or segments of the uterus may cause anteflexion.

Imperfect development of the vagina, absence of Douglas' cul-de-sac, or the presence of cicatricial bands about the vagina which push or draw the cervix uteri, may cause anteflexion. An abnormal utero-sacral or other ligament may also cause anterior displacement.

The cervix, when abnormally developed, as when too long to find free play in Douglas' pouch, will be forced forward in the direction of the outlet of the vagina, and thus will necessarily flex on the body, or displace the fundus uteri backward. Fibroid or other tumors may displace the uterus forward by their weight or pressure, or may increase the length and size of the posterior wall, and thus cause forward flexion.

Habitual constipation, straining at stool, etc., during the period of development, during menstruation, or at any time when the uterus is soft and weakened by disease, may cause anterior displacement. The same is true, under like con-

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ditions, of lacing, excessive or violent exercise, or remaining too long in the standing position. But it must not be forgotten that pressure transmitted through the abdomen, containing only its usual contents, is not all spent upon the fundus uteri, but more or less equally on its sides, on the bladder, rectum, and the whole floor of the pelvis, and that some of this force thus tends to support the uterus in its upright position, and the resultant of the force is rather a general downward movement of the floor of the pelvis, and everything attached to it, than the displacement of one organ. For this reason, I doubt very much that a blow or fall or any other external force than one continuously acting on an abnormal uterus, would be likely to result in causing serious anteflexion. Such force as would be caused by lifts, strains, etc., may cause prolapse, retroversion, and retroflexion, or tear a ligament, and thus cause serious local disease; but, except when acting together with some predisposing cause or abnormal condition, I have never seen an anterior displacement caused thereby.

I have no doubt that the anterior change of position and flexion caused by one physical bimanual examination is often greater than that caused by a blow or fall. It is true that such examination may do harm when predisposing conditions exist. Constant pressure, such as is caused by lacing, tends to depress the floor of the pelvis and carry the uterus downward and backward, and may flex it forward when it is soft.

The influence of the upright position on flexion has not been fairly stated by authors; for the direct influence of the weight of the fundus in flexing the uterus has been greatly overestimated. I am satisfied that most of the local pain is due to congestion produced by the upright position, congestion in and around the uterus, and to the general prolapse of all the pelvic organs, and is rarely solely due to the weight of the fundus acting on the seat of flexion. Stand a uterus up on its end outside of the body, and gravity acts with the full weight of the fundus; but in the pelvis of a living woman it acts only with the weight of the fundus minus the average weight of all this cavity contains, or rather its elastic media,

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elastic tissue, blood, gas, etc. In cases where the nerves of the lining membrane are hyperesthetic, this slight weight probably has some influence in causing additional pain, especially when the point of curvature is such as to allow an up-and-down motion from a slight cause. It is true that often a well-fitted anteflexion pessary will afford great relief, and usually, when it does, it is not by straightening the uterus and thus preventing occlusion of the canal, but by steadying the uterus and preventing this up-and-down motion of the fundus, and by counteracting, to some extent, the bad influence of the prolapse which is so often associated with anteflexion.

A sedentary life which prevents general development of the muscles, or causes them to become soft and flabby, may give rise to uterine disease by inducing stagnation of the pelvic circulation and by furnishing conditions which stimulate perverted and abnormal erotic excitement. Many cases in which the vaginal os is normal and the supra-vaginal cervix is flabby and elastic and apparently elongated, with a small ball of a fundus bobbing about, seem to be produced by the effect of too frequent erotic excitement on the circulation. Such cases will usually admit that they have frequent and often abnormal sexual desire, and in most of these cases there is a congested fulness about the left broad ligaments which remind one of the varicocele on the left side in frail young men.

PATHOLOGY.

For several years past, I have given up the belief that anteflexion frequently causes dysmenorrhea directly by mechanically closing the canal and thus obstructing the menstrual flow. Where there is obstructive dysmenorrhea, I believe it to be due, as a rule, except in rare instances, to stenosis of the os uteri at some point, or to clonic spasm at the os internum; and, in the majority of cases of dysmenorrhea in anteflexion, I think it is caused by the hyperesthetic condition at or near the os internum, combined with more or less stenosis at this point—stenosis due to degeneration,

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contraction, and atrophy, and not to occlusion caused by the sagging or bending of the uterus. Of course, I except those cases in which the dysmenorrhea is caused by salpingitis or ovarian diseases, or other diseases that may be associated with anteflexion.

In cases of dysmenorrhea with anteflexion, the passing of a probe or sound through the os internum causes severe aching pain and frequently the patient will voluntarily exclaim that it causes the same pain and sometimes the same reflex disturbances as menstruation. In many of these cases, the withdrawal of the sound is followed by blood. It may be asked: Why is the os internum and the spot just above it so hyperesthetic, while the cervical canal below this point is not in this same condition? I would say that, aside from the narrowing of the canal and probable spasmodic contraction at this point, the membranes are different in kind, and for some of the same reasons that pharyngitis is much more common than stomatitis, degeneration may affect the mucous lining at the os internum, and not in the same way that of the cervix below.

One can never actually see the state of things at the os internum in such cases during life, but to me the mucous membrane and nerves seem to be in a condition somewhat, if not exactly, similar to the mucous lining in a case of phymosis, when inflamed or congested; it is exquisitely sensitive and irritable, inducing perversion of sexual function and serious reflex disturbances, and, like phymosis, tending to contraction of the orifices and loss of elasticity and capacity of expansion. Other cases of this disease, where there is flexion and hyperesthesia of the mucous lining of the canal, are comparable to a stricture of the urethra, especially in the prostatic and membranous portion, and in my hands the treatment of the two is in principle exactly the same, and, at least so far as the dysmenorrhea goes, is successful. Often simple stenosis of the os externum may be associated with flexion, and may be the real cause of the dysmenorrhea; but, if so, the contraction must be extreme.

The mucous lining at the point of curvature may be swollen and congested and menorrhagic, or it may be pale and

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degenerated, with thick, hard, and fibrous, rather than muscular walls, and these may be rigid and contracted. The latter is usually the case in the congenital type, or those in which the flexion was acquired before maturity. In other cases, the muscular tissue is scant, and the walls are composed of soft and flexible connective tissue, or they may be indurated and give evidence of old inflammation of the connective tissue, and these are usually the ones in which the flexion was acquired after maturity. The os internum is usually contracted, and is inelastic, the contraction being due to organic rather than mechanical causes. There may be dilatation of the uterine cavity above the flexion, and in such cases the os internum is found stenosed.

Anteflexions may be divided into two classes:

1st. Those which are usually termed congenital. In these cases, the curvature exists before puberty, or is acquired before maturity is completed, and is mainly the result of interrupted or imperfect development.

2d. Those in which the curvature takes place after full development. In these cases, the flexion is due to softening or loss of tone in the uterine walls, the result of general loss of health and local disease, or of local disease alone.

In the first class, due to or complicated by imperfect development, both the fundus and cervix are frequently bent forward. In other words, the organ is doubled upon itself, causing the axis of the cervical and corporeal cavities to form a parabolic curve, and the flexion is more or less fixed, often so much so that the whole organ may be found rotated backward, and be really both anteflexed and retroverted at the same time. As a rule, the point of greatest curvature is at some point between the vaginal junction and the os internum. The vaginal portion of the cervix is bent so as to conform to the long axis of the vagina, with the os directed toward the pubic bone. It is usually hard, abnormally small, flattened, and somewhat pointed, its anterior lip crowded forward, giving the cervix a snouty appearance. The anterior flexion puts on the stretch the posterior wall, pulls back and upward the posterior lip, and doubles up the

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anterior wall, which presses forward the anterior lip. The vaginal tissues of the anterior lip are, as it were, folded up, so that the vaginal junction appears to be very near the end of the anterior lip, while the vaginal tissues covering the posterior lip are smooth, and tensely stretched over the cervix up to the vaginal junction, which is usually more than an inch from the end of the posterior lip. The fundus is also usually undersized, and is bent forward and fixed, forming a sharp angle with the cervix. The crowded tissues that unite the uterus with the bladder and the vaginal junction fill up, to some extent, the angle of flexion, and feel like a mass of adhesive tissue that unites the fundus and cervix, and at the same time appear to limit the degree of flexion.

In some of these cases, the cervix seems to be the only part displaced, and, as a rule, when only one part is bent forward it is the cervix. Frequently there is some erosion of the mucous membrane in and around the os externum, or it may be small and contracted, but in most cases, while the cervix is small, the cervical canal is open and free from active disease up to the os internum.

The os internum is in many cases abnormally small, and often exquisitely sensitive. Hyperesthesia of the os internum occurs in the degeneration and atrophy incident to old age, and in cases of degeneration occurring in the young, the same contraction may also take place. The introduction of a sound into the atrophied uterus of an old woman who is nervous and suffering from local trouble, or even who has no well defined local symptoms, will often give the same pain which is frequently caused by sounding the infantile anteflexed uterus in a young woman.

The uterine cavity just above the os internum is also frequently very sensitive to the touch, and bleeds readily. Sometimes the whole lining membrane of the body is painful to the touch, and the same sensations are induced as are felt during menstruation.

As a rule, the canal measures less than two and one-half inches, but in some it may exceed this. Often the vaginal cervix feels abnormally long, but usually in such cases the

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body is flat and abnormally short. It may be that the flexion is above the os internum in these cases, but this is not easy to determine; for often this apparent elongation of the cervix is due to the fact that all of the cervix is readily felt, being crowded down into the vagina by the flexion. Not infrequently the point of flexion is held abnormally high up and backward in the pelvis, and in these cases the whole organ is more or less immovable, and the flexion firmly fixed. This may be due in some cases to adhesion and contraction of the sacro-iliac ligaments, the result of inflammation, but it seems to me in almost all cases to be caused by early failure of development involving the ligaments; for in the early stages of development the uterus is relatively high. In other words, the descent of the uterus is arrested at the same time the complete development of the uterus is interrupted.

In many cases the uterus is low in the pelvis and abnormally near the pubes; and in some cases the vagina is small, short, and Douglas' cul-de-sac more or less shallow. In these cases it is easy to understand why the cervix bends forward, for when the fundus is flexed forward, the cervix is forced backward, and if it meets resistance due to a short vagina, it is gradually bent forward in the long axis of the vagina. Obstinate and chronic constipation and tight lacing probably play an important part in producing those cases where there is much prolapse.

Frequently there is an abnormal fullness in the left broad ligament which may be due to old peri-uterine inflammation, but which I am satisfied is more frequently caused by faulty circulation in this region; the blood-vessels are in a condition resembling varicocele in the male, which is almost always greatest on the left side. Not infrequently this last condition is associated with a prolapsed ovary, as I have repeatedly convinced myself during laparotomy performed for dysmenorrhea. In some of these cases it may be that the catarrhal disease extends from the uterus to the Fallopian tube; I am certain that this is frequently the case in those due to gonorrhea. I have lately kept a number of cases under observation, without treatment, for the purpose of studying the

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course of this disease. In my service at Bellevue, both the subjective symptoms and physical examinations plainly indicated that from the vagina the endometrium becomes affected, and later the parametrium is attacked.

In those cases where the uterus is flexed after having been fully developed, the flexion is often movable or readily reducible, unless after flexion there has been peri-uterine inflammation leaving adhesion that binds the fundus down; of course, excluding the few cases of anteflexion that may be the direct result of the contraction of such adhesions. Sometimes the fixed cases of flexion due to arrest or imperfect development may be loosened by some such change as abortion, or perhaps by retained menstrual blood repeatedly distending the cavity. But almost all cases of readily reducible anteflexions would seem to be the result of chronic endometritis or repeated congestion caused by frequent erotic excitement or some similar influence extending to the connective tissue, if not to the muscular fibres, and gradually softening or inducing atrophy of the walls at or near the internal os.

In these cases, the cervix may not differ much from the normal position and shape, while the supravaginal cervix, or the part that is bent, is relatively small, flexible, and sometimes apparently elongated to such an extent that the round and small fundus can be moved about *ad libitum*, often in any direction. Such cases may be sometimes found retroflexed, and during or about the menses may be found erect and moderately firm. When the cervix is bent forward in this class of cases, it is usually enlarged and hard, with more or less discoloration due to imperfect circulation, and the flexion is more decided and fixed than in the simple cases when the cervix is not displaced.

Rarely cases are found where the fundus seems flexed above the os internum, but, as a rule, such cases are those in which there has been peri-uterine inflammation, with resulting adhesions pulling the fundus sharply forward, and I believe flexion of the body takes place when the fundus is enlarged and soft, being rendered so by dilatation of the cavity, or left soft by receding inflammation or congestion.

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I have seen two or three cases where the cervix was flexed forward and the fundus was flexed backward, but such cases are rare.

In the first part of this paper, I undertook to show the following: The normal uterus is flexed forward, and so placed in the pelvis that downward pressure does not act directly on it. It is so suspended, surrounded and sustained by an elastic medium, the pressure of which is regulated by the heart's action and the contractility and elasticity of the muscles and fasciæ of the blood-vessels and the abdominal walls—the vital pressure—that the weight of the normal-sized fundus has but a slight tendency to increase the anteflexion; the body of the uterus being sustained and protected very much as though it were surrounded by water. Many authors have overlooked these facts, and have been led to lay too much stress upon the effects of falls, blows, etc., in producing anteflexion, and have taught that bending closes the uterine canal mechanically, and thereby creates the symptoms, etc.

Anteflexion does not constitute the disease, but is the result of imperfect development or of disease—a condition associated with certain pathological changes in the tissues of the organ. The causes of these pathological conditions are, 1st, congenital influences; 2d, general and special causes tending to prevent perfect development, and thereby inducing premature atrophy and degeneration; 3d, diseases which soften the walls, or those which enlarge the fundus, or lengthen the cervix, or relax or overstretch the suspensory ligaments, etc., etc.

Except in rare instances, I do not think that the mechanical effect of the flexion causes the symptoms, dysmenorrhea, etc.; but they are due to the degenerate, hyperesthetic, and more or less contracted or stenosed condition of the tissues, chiefly at or about the os internum. In other words, the mere fact that the uterus is anteflexed has, as a rule, little to do with the disease or symptoms.

I now return to the continuation of my subject.

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PREVENTION.

The true etiology of a disease, of course, indicates the steps to be taken to prevent it. As long as delicate children are born and enabled to reach maturity, women will suffer with small, imperfectly formed, and degenerated genital organs. We may expect to find anteflexed uteri among those children who, though born of healthy parents, are underfed or badly nourished, whose health was crippled by disease or bad hygiene before or during the development of the generative organs. To prevent anteflexion or imperfect development and degeneration of the generative organs, children with good constitutions should be kept in good health until fully matured, and delicate and stunted children should be so treated as to increase their physical strength and have a surplus of force for the full development of the generative organs. In the country, children are often underfed; while in large towns bad air and excessive mental tension and emotional excitement are the chief hygienic faults. Among the poorer class the law of "the survival of the fittest" is not so much interfered with, and hence the feeble, relatively speaking, seldom reach puberty. This fact is, to me, strikingly illustrated by comparing my office practice with my hospital and clinical service; in the latter a well-marked case of anteflexion is comparatively rare, while in my private practice this condition constitutes a large percentage. Good food and fresh air are always essential to good health, and are generally so considered. Yet it is not, as a rule, considered hurtful to children to begin absorbing mental training too early, and keep it up too intensely. Just when a girl is beginning to develop into a woman, while being urged at lessons and confined from twenty to twenty-three hours in the devitalized air of a furnace-heated house, she is allowed to become interested in society and emotional excitement, which too often leads to bad habits and nervous exhaustion. Of course, many girls have a sufficient surplus of strength to develop fully the organs of generation under all these disadvantages; but even these constitutionally strong ones give way if, in addition, they have a prolonged or se-

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vere attack of illness, such as scarlet fever, typhoid fever, etc., and it is rare to see a girl pass from ten years of age to twenty without more or less anemia. It is during this time that the generative organs degenerate and lay the foundation for anteflexion, dysmenorrhea, sterility, or lacerated cervix, etc.

It is plain that good health throughout development is essential to a child. Besides good food, fresh air and exercise, the moral and mental environments should be healthful and not too stimulating and absorbing. To the constitutionally feeble, or to convalescents, besides good physical, mental and moral hygiene, the syrup or elixir of the hypophosphites, iron, selected and partially digested food should be given. It is surprising how much can be done by careful feeding with selected food suitable to age, etc., even with feeble, puny, stunted children; but too often this careful attention about food, etc., is relaxed, and the children are left to judge for themselves, and are only seen or directed when really ill with some active disease.

Lacing without doubt has a marked influence upon the abdominal organs; it prevents normal action of the abdominal muscles and directly compresses and displaces the liver and kidneys, especially the latter, and as it adds greatly to the abdominal pressure and destroys the normal elasticity of the abdominal walls, it certainly tends to displace the uterus downward, and may increase anteflexion. The corsets which extend below the waist and compress the abdominal walls, are by far the worst.

Lacing, if begun early, can do great harm, and yet be so gradual as not to be noticed; it may, by destroying the functions of the abdominal walls, prevent their full development and permanently weaken them.

Local treatment, as a preventive in cases due to imperfect development, is hardly practicable, for usually flexion already exists when the first sympton (dysmenorrhea) occurs. In cases of flexion acquired after puberty, the prevention is indicated by the etiology. Local treatment, if given at all, should aim at stimulating healthy development.

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TREATMENT.

These cases usually seek medical advice on account of dysmenorrhea or of irregular menstruation. Yet not infrequently a woman will bear with the pain for years, and finally consult a physician for sterility.

Sometimes menstruation is painful from the first, but many cases are preceded by irregular and usually scanty menstruation. I rarely make a local examination in unmarried women for either dysmenorrhea or amenorrhea, without first trying the effect of general treatment—suitable food, Blaud's pills, syrup of hypophosphites, laxatives, etc., as indicated; often these measures give complete relief, they nearly always do good and prepare the way for successful local treatment. If leucorrhea be one of the symptoms—and it often is—I order half a gallon of hot water to be injected into the vagina once or twice in twenty-four hours. If the patient is under eighteen years, or is likely to be married soon, I usually defer a local examination for several months, and even longer if the symptoms are not urgent. After a fair trial of this treatment, I insist upon a local examination, for undoubtedly the longer local treatment is delayed after improving the general health, the more difficult will it be to effect a complete cure, and the more likely is it that the case will become complicated by ovarian or other peri-uterine disease. Under the head of pathology, the physical conditions were minutely described. I made two distinct classes for the sake of clearness, but practically the two often merge into each other.

By far the most common type among the well-to-do class is that where imperfect development is plainly indicated. Often the external genitals are small and undeveloped, and the vagina may be found narrow and short. The cervix is most frequently found near the vulva, small and hard, with its axis curved forward and parallel to that of the vagina. The anterior lip or vaginal part of cervix is short and frequently quite sharply flattened (snouty), while the posterior wall of the cervix is curved forward and put on the stretch, the mucous membrane smooth and the vaginal portion rel-

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atively long, as compared with the anterior lip. The fundus, flexed forward on the cervix, can be plainly felt by bimanual examination.

In Sims' position, with his speculum in place, a properly curved sound can be readily passed to the os internum; at this point there may be some resistance, and as the instrument passes, the patient usually complains of sharp pains. The fundus may be found sensitive to the touch of the sound, and not infrequently its withdrawal is followed by blood, although it may have been passed with the greatest care.

Not infrequently such a case is complicated by more or less hyperesthesia and perhaps some atresia of the vagina and sensitive ovaries, with an abnormal fullness especially marked on the left side in the broad ligament, undoubtedly in many cases due to varicose veins. I usually begin the local treatment of such a case by inserting a small piece of borated cotton, saturated with pure glycerin, against the anterior lip of the cervix, crowding it somewhat backward in the vagina. The cotton rolls into a ball which tends to displace the cervix backward and lift the fundus. A string is left attached to the cotton, by means of which the patient can remove it, which she is instructed to do in twenty-four hours. The object of this tampon is to soften the tissues, which it does by causing a profuse watery secretion. It seems to improve the local circulation, and invariably tends to relieve the hyperesthesia of the vagina and pelvic tissues. The pledgets are put in two or three times a week, until the patient bears the vaginal examination without pain. The patient is also instructed to use hot-water vaginal douches during the intervening days.

If the case is complicated by peri-uterine congestion or "subacute inflammation," the simple glycerin pledgets are replaced by similar pledgets saturated with a mixture of alum one part to pure glycerin fifteen parts, and sufficient carbolic acid to act as a disinfectant, usually one drachm to the pint. The size of the pledgets is gradually increased. As a rule, an ordinary case will be much changed in two or three weeks by this preparatory treatment; the vagina is less sensitive and

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larger, the cervix is less pointed and its axis directed farther backward, the peri-uterine tissues are softened and less painful upon examination. Occasionally a case of long standing, in which the nervous system has been seriously affected, will require six or eight weeks of such treatment before the next step can be safely undertaken.

Dilatation.—The patient being in Sims' position, the vagina is sponged out with a solution of 1 to 3000 of bichloride or one to twenty of carbolic acid. All instruments are kept in a solution of carbolic acid. Then a Sims' uterine dilator is inserted into the uterine canal. The dilator, when properly curved, can be passed almost as easily as a curved sound; the blades should be forced apart about two lines. The amount of force required for this amount of dilatation will, of course, vary greatly, but usually in old cases it is considerable, especially those of the imperfectly developed type. This procedure causes more or less, and in some cases intense pain, similar to that due to menstruation. The dilator is withdrawn and a cervical protector introduced to the os internum. An applicator previously wrapped with cotton is dipped into pure carbolic acid; the free acid having been rubbed off, it is passed through the tube of the protector directly to the os internum, and thoroughly applied by turning it about and slightly withdrawing the tube and applicator. About twenty grains of iodoform are blown against the cervix as the speculum is withdrawn. In some cases the pain is immediately relieved, rarely the patient complains of cramping pain for several hours. When properly performed as directed above, and if antiseptic precautions were used, I have never seen any harm from this treatment. The first dilatation can be made at the patient's home, and she is kept in bed for the rest of the day or until all disturbance has ceased. As a rule, it is best to allow at least a week to pass before the dilatation is repeated. The glycerin pledgets can be inserted as usual. Sometimes I repeat the dilatation three times between the menses, but usually twice is sufficient, and if the dilatation can be carried to the point where the blades are four lines apart at the os externum, the dys-

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menorrhea is relieved in the majority of cases where there is no active endometritis or endocervicitis, and in favorable cases it is the beginning of a permanent cure. Much will depend on the condition of the general health and on the readiness with which the lining membranes of the uterine canal respond to the treatment. Where the tissues are not sensitive, and the uterus is small and atrophied, I use iodine in place of carbolic acid, or I apply electricity directly to the uterine tissues and persist in the treatment until the uterus develops.

Besides the vaginal and peri-uterine hyperesthesia, any complication such as vaginitis, acute endo-cervicitis, local cellulitis, or peritonitis should be treated before resorting to dilatation for the removal of dysmenorrhea. In those cases where catarrhal disease or anemia are active agents in producing the stenosis or hyperesthesia of the os internum, the dysmenorrhea will of course be likely to return unless these conditions are permanently corrected. The changes produced by this treatment are: a shortening of the cervix, a nearer approach to the normal direction of the axis and shape of the vaginal cervix, and a complete alteration in the mucous lining. Any subacute congestion with faulty secretions is usually cured, the secretion of the cervix becoming transparent like the white of an egg. After this treatment, a sound can be passed to the fundus without causing pain.

In married woman, if nothing is done to prevent impregnation, sterility will often be cured by this simple treatment. But in a certain number of cases this method gives only temporary relief. The stenosis is accompanied by so great a change in the muscular walls, or there is so strong a tendency to spasmodic contraction of the os internum, that simple dilatation will not cure the dysmenorrhea or sterility, and it becomes necessary to resort to Sims' operation, which is a combination of divulsion and incision, with the use of a glass plug or stem pessary, or, what I like better, a hard-rubber drainage tube.

Sims' Operation.—In some cases the simple dilatation cures the dysmenorrhea, but not the sterility, and here

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again it is necessary to resort to Sims' method of operation. I do the operation as performed by Dr. Sims, with some modifications. I employ the above preparatory treatment with pledgets of cotton saturated with glycerin, etc., always carefully treating any complication such as peri-uterine inflammation beforehand; for as long as the uterus is fixed by old adhesions, any dilatation or operative procedure is attended with risk. When the uterus is movable, so that the cervix with little resistance or pain can be pulled well down to the vulva, while the patient is in Sims' position, it is usually safe to operate. My patient is instructed to take a laxative and bath, to have fresh clothing, bedding, etc., and to take a vaginal douche of solution of bichloride one to three thousand, preparatory to the operation. Instruments needed: one doz. sponge holders with new aseptic sponges; Sims' uterotome; Sims' speculum, depressor, forceps, sound-tenacula (two), flexible director, uterine dilator, applicator, hard-rubber or glass plug, a needle holder, and a threaded slightly curved needle with silver wire, to be used in case the circular artery is severed. A straight bistoury can be used in place of a Sims' uterotome and, unless the tissues above the os internum are to be divided, it will do nearly as well. These instruments are all immersed in five-per-cent solution of carbolic acid. The patient being etherized, is put in Sims' position; the vagina is carefully sponged out with the one to three thousand bichloride solution, a strong tenaculum is fixed in the anterior lip of the cervix which is pulled to the vulva. With the sound the uterus is explored; the dilator is then introduced, and the uterine canal slightly dilated so as to allow the blade of the uterotome to pass readily. The straight blade of the latter is then introduced, cutting edge backward, up to the os internum or the point of flexion; the posterior wall of the cervix is divided in the median line for half an inch or more, according to the length of the infra-vaginal part of the cervix; the lining mucous membrane is divided the full length of the cervix, and the muscular walls are also divided for some distance under the external mucous membrane

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covering the infra-vaginal cervix. As a rule, there is very little bleeding, and where the circular artery is normally placed it will not be divided. It is a mistake to divide all the muscles, and especially the vaginal mucous membrane of the cervix, as far as the vaginal junction. After this incision, the dilator is introduced and the os internum freely divulsed. Dr. Sims always divided the anterior wall at the os internum with his uterotome, but I have lately trusted to the dilators to overcome all constriction at this point, for I have never seen a full-sized plug introduced after incision as far as the os internum without the free use of the dilators. The dilatation should be done slowly so as to give time for the tissues to stretch and not tear. In many cases the amount of force needed to overcome the constriction is very great, not less than the full force of the grip of one hand; if this force is kept up for a minute or so, it will usually suffice, and it is well to repeatedly try to introduce the plug, and to be satisfied with the amount of dilatation when a full-sized moderately curved plug can be introduced to its full length (two to two and a quarter inches) and remains in place without being held in position. It is at this point of the operation where failure is often made, for many times the point of the plug, especially if straight, strikes against the os internum at the point of flexion, and forms a pouch behind it, which, with the elongation caused by the stretching of the cervix, allows the tube to enter the cervix almost to its full length. This leads the operator to think that it has entered the cavity of the fundus, and he inserts his tampon, etc. Now the test whether the plug has passed the os internum and entered the fundus is that it will remain in place and not tend to spring back and out as soon as pressure on it is removed. Once it is well through the os internum, it is grasped by the circular fibres and remains in place. In some cases, of course, it is more difficult to pass the tube than in others. Where the flexion is decided and the lining membrane of the cervix lax, the point of the plug invariably glides behind the os internum and puts the lining membrane and the posterior wall of the cervix on the stretch.

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More than once I have seen this operation done and the tampon put in to hold the plug forcibly in place, and afterward had the opportunity to prove that the cavity of the fundus had not been entered by either the knife or plug. Even in the hands of Dr. Sims himself I have seen failure to get a good-sized plug in at one sitting. I am quite certain that this difficulty accounts for some of the failures to do good by this operation. In certain cases it would seem next to impossible to introduce Simpson's or Peaslee's uterotome or any straight instrument without first dilating the external os by tents or other means to relax the os internum and straighten the canal. Straight dilators may be made to pass up into the cervix two inches or even more, but they will push the os forward or to one side and will not enter the cavity of the fundus of the uterus. I have had Sims' dilator made with blades curved so that it can be passed as readily as a sound. It should be of the very best steel so as not to yield under pressure, and the joint should be sufficiently far back to allow the blades to open and remain nearly parallel.

When the plug can be readily passed into and through the os internum, it is well to apply a little pure carbolic acid on an applicator to the lining membrane of the cervix, then to replace the plug, cleanse the vagina, and blow into it a half drachm of iodoform; this is absorbed more slowly and remains longer than any other antiseptic. Dr. Sims made it a rule to insert styptic cotton against the plug and cervix, and then over this a firm tampon, the object being to prevent hemorrhage and at the same time keep the plug in place. I do not place the pledgets until the hemorrhage is completely checked, and usually the pressure of the plug alone stops the bleeding. If the circular artery is cut, I ligate it by passing a silver suture around and twisting it. Then I insert boro-glyceride or other antiseptic pledgets of cotton sprinkled with iodoform, until the vagina is moderately tamponed, the object being mainly to keep the plug in position. After each urination the vulva should be washed with an antiseptic solution (bichloride 1 to 5,000) and an anti-

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septic dressing kept on it for a week. On the second day I remove the cotton if there is the least odor, and insert fresh pledgets after thoroughly cleansing the vagina; the plug being left undisturbed. On the sixth or seventh day I remove the plug, and after cleaning it and the vagina, I replace it and keep it in position with either iodoform cotton pledgets or a vaginal pessary. It is allowed to remain for a week or two longer, as the case may seem to require it. Dr. Sims usually removed the plug on the fifth day and left it out, but I prefer to retain it in place until the surface has entirely healed. Unless the plug is a very large one, it can be safely left in place during menstruation. I prefer plugs which have one or more deep grooves in them so as to permit of free drainage, and my objection to the iron or styptic cotton and large firm tampons is, that drainage is obstructed and thus the risk of septicemia increased. When the case has been properly prepared and the above precautions have been taken, the risk is very slight and the result most satisfactory. To get good results, one must do all that can be done to improve the general health of the patient, and give the proper preparatory treatment, which not only lessens the chances of doing harm, but also enables one to carefully study the case and patient and eliminate complications, such as diseased tubes or ovaries, etc. If one takes a delicate and weak woman, with an imperfectly developed uterus, with a degenerate and granular eroded mucous lining, and divides the cervix *too freely*, he may relieve the dysmenorrhea, but he will do his patient harm, and sooner or later she will have an everted and diseased cervix resembling a lacerated cervix, and requiring the same treatment.

If one dilates the cervix or divides it with a knife, while the patient has a diseased tube tense with an irritating or poisonous fluid, or a diseased ovary filled with tense cysts, any of these may burst or break and cause local peritonitis. Or if one operates, without using antiseptics or preparatory treatment, upon a patient with a diseased mucous membrane, he may cause local poisoning of the deeper uterine or peri-uterine tissues and get what we call inflammation; but this

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is the fault of the operator and not of the operation. Eliminate failures to diagnose serious complication, and blood poisoning from lack of care in cleanliness or from prejudice against the use of antiseptics, and this operation becomes one of the simplest in uterine surgery.

I have never believed in the necessity of the bilateral operation. In those cases where Dr. Sims recommended it, I would dilate and drain, or divulse and keep open with a drainage tube.

If the dilatation is imperfectly done, the relief, of course, is only temporary, but when thoroughly done and repeated, say twice in two or three months, it will often effect a permanent cure in cases of even ten years' standing. I know several whom I treated as long ago as six or eight years and they are well to-day. Undoubtedly there are cases that can be relieved of dysmenorrhea, but not permanently cured of sterility; for there are some cases in which the organs have reached only a very imperfect degree of development, or have atrophied and changed so much that they cannot be fully developed by any treatment. In some of these the local application of electricity will do good, by stimulating development. It is a simple matter to apply electricity, but its use must be kept up for several weeks before it will have a perceptible effect. The galvano-electric pessary of Simpson may be used in certain indolent cases, but it must be closely watched. A good drainage tube of hard-rubber is much safer and perhaps equally efficacious. If a woman with anteflexion is to marry, she should marry early in life, for the chances of pregnancy and full development then are undoubtedly better than later. I am certain it helps these cases, for normal erotic excitement stimulates development and averts abnormal functional derangement and bad habits.

Child-bearing is the best means of completing development and making a permanent cure of such cases. One would expect that small imperfectly developed uteri would be torn more frequently than in the average cases of labor, and this is a fact, especially if the labor is quick or premature, for the cervix requires time to get into the best condi-

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tion for full expansion. I have found that more depends upon the condition of the mucous membrane at the time of the laceration and shortly after labor, than upon the size of the os or the extent of the tear. Diseased tissues heal badly and tend to swell, evert, etc.

Sponge tents.—For more than ten years I have not used tents in these cases. Without doubt, some cases can be cured with them, but their use is more dangerous than that of the dilator, and much more uncertain in results. I have my tents made with iodoform mixed in the gum, and I use iodoform and bichloride tampons to keep them in place. I never allow them to remain more than twelve hours, for they form a most excellent nidus for germs, and for a time they prevent drainage from a very much irritated, rapidly secreting mucous membrane.

Dilatation by Sound.—Whenever I see a specialist using a set of graded uterine bougies or sounds, especially such as are nearly straight, I know that he is travelling over an old road that was pointed out by Mackintosh many years ago. The uterus is too movable and elastic to permit of the use of sounds to the best advantage, and many a case has been sounded up to the os internum and not beyond.

To Simpson belongs the credit of the first uterotome, but Sims was the first to perfect that instrument and to understand fully how to use it. He pointed out the mistake of using automatic and straight uterotomes in the uterus.

In June, 1873, Dr. John Ball, of Brooklyn, N. Y., read a paper before the Medical Society of Kings County, on rapid dilatation of the cervix uteri for the relief of stricture, etc., and in 1877 he presented a paper on the same subject before the N. Y. State Medical Society. About this time Ellinger, of Stuttgart, advocated forcible dilatation. Dr. Ball reported a number of cases successfully treated by rapid dilatation. There can be no question about the success of divulsion, but there are many cases which can be perfectly cured by moderate dilatation, which is not only less dangerous, but I think gives better results in those cases where imperfect development is more marked than spasmodic stricture. For

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it is not a powerful and spasmodically constricting muscle that is to be overcome, but a feeble degenerate organ that needs to be stimulated to healthy development. In cases of atresia of the cervix where the vaginal cervix is large and only slightly flexed and pointed, where Dr. Sims advised the bilateral incision, I do use divulsion and insert a drainage tube, and I do the same in cases of chronic catarrh where there is indication of spasmodic stricture of the cervix. But when I am treating sterility, and have a flexed, hard, and pointed cervix to deal with, I am sure that the knife, applied, as stated above, is an improvement upon simple divulsion, for the os externum tends to contract and close the opening after the latter operation, unless the tissues are torn by the instrument. Still I confess that we could more easily dispense with the uterotome than with uterine dilators. There is less risk in opening the uterine canal with dilators than with the uterotome, but dilators can do serious harm when the dilatation is carried too far, and if one uses a screw to force open the dilators, the risk is greater then when he uses his hand or hands to regulate the amount of dilatation.

Use of Pessaries in Anteflexion.—If the use of pessaries in such cases had never been taught, much harm would have been averted and more progress made in the right direction. Very rarely only can we afford some relief by the use of an anteflexion pessary, but at best it is only palliative and can be dispensed with. It is not so much by straightening the flexion that the pessary does good, as by preventing prolapse and perhaps by steadying the fundus. The instrument I prefer is a simple one which I devised and first used six years ago. It is easily introduced, has no joints, carries the cervix backward while it sustains the fundus, and cannot become displaced in the vagina. I usually introduce it with a small silk string attached, and instruct the patient to pull it out whenever it becomes uncomfortable. But I must confess that now I very rarely use any pessary for anteflexion. As to the use of stem-pessaries for straightening the canal, they may do good by stimulating development, but many of them are dangerous instruments.

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In some cases, especially those affected with chronic catarrh, I use a glass plug, or I should say drainage tube, made of tough glass, or better, hard rubber, with one or more deep grooves in it. The object is to keep up perfect drainage and perhaps stimulate development, but not with the idea of using a splint on a fractured or bent uterus. The good results obtained by the use of glass stem-pessaries are undoubtedly due to their help in stimulating development, in perfecting drainage, and permanently overcoming the tendency to atresia and hyperesthesia at or near the os internum. Cases of anteflexion acquired after full development I treat very much in the same way if there is stenosis of the cervix or subacute endometritis, but often the peri-uterine inflammation, diseased Fallopian tubes, or other disease associated with it, is the condition to be treated.

COMPLICATIONS.

Anemia, chlorosis, or phthisis are always serious complications, and unless we can improve the general condition, we might expect to relieve some of the symptoms, but not to cure the imperfect development of the uterus. Catarrh or a low grade of inflammatory condition of the mucous lining would be expected in a degenerated and imperfectly developed uterus, and in various stages it is a common complication. In most cases it is confined to the canal of the cervix, and is usually cured by the same treatment which develops the uterus. When the lining membrane of the fundus is inflamed, the condition is more serious and the symptoms are so changed that the affection is not classed as anteflexion. In these cases, dilatation, drainage, and careful and efficient applications are essential to a cure, and where these fail we can be pretty certain that the disease has extended to the Fallopian tubes, and then we must remove the tubes and ovaries to effect a cure. The tubes are much more frequently involved than has been heretofore supposed. It is this fact which makes gonorrhea and septic endometritis so serious a complication. Diseased tubes explain the majority of peri- and para-uterine complications.

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The tubes cannot be dilated, drained, and treated locally, and the disease, once there, takes its course.

Some of the conclusions may be concisely stated:

1st. There is undoubtedly a certain number of cases in which a marked degree of anterior curvature gives no painful symptoms.

2d. Anterior displacements are the result, rather than the cause of pathological changes in the uterus. They may add to and sometimes intensify disease, but are rarely, if ever, the primary cause.

3d. Dysmenorrhea with anteflexion is rarely, if ever, chiefly and directly due to the flexion, but the latter in some cases may aggravate the pathological conditions which are the real cause of the pain.

4th. The attempt to correct anterior displacements by the use of pessaries is rarely, if ever, sufficient to effect a cure, unless the cervix is dilated at the same time or other pathological conditions are treated. The use of mechanical supports may give some relief, but they are merely palliative, and as used by many they frequently do harm.

5th. The true morbid condition of the uterus in most cases of anteflexion is one of imperfect development, while the uterine canal is more or less stenosed by the degenerate and contracted state of the uterine tissues, and the mucous lining is degenerate and atrophied, often hyperesthetic, especially in that part of the organ where the circular fibres are most powerful and contracted, at the os internum.

6th. If the above is true, the treatment obviously would be to stimulate development by improving the general health and by the local use of electricity, to relieve the stenosis by dilatation or division and divulsion, to perfect the drainage, and bring about a healthy condition of the mucous lining.

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THE PREVENTION AND TREATMENT OF PUERPERAL FEVER.

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AT a time when a flood of literature pours in upon the practitioner of medicine from numberless sources, upon every conceivable subject connected with his calling; when original ideas are spread out over space as gold-beaters hammer foil; and when the changes are rung upon every meritorious essay by a host of others which offer the reader merely the same thoughts in different words—it is pertinent and justifiable for every member of this audience to demand the motive, or, as our Gallic neighbors would express it, "the *raison d'être*," of a paper upon so trite a subject as the present, and one which has already received the attention of many of the brightest intellects devoted to obstetrics.

I accept this challenge to-night, and, before beginning my essay, shall strive to justify, if I can, its preparation. I freely confess that it contains nothing that is original, nothing which has not elsewhere been as fully and as clearly stated, nothing which has not already received careful consideration at the hands of the progressive obstetricians of the world. And yet I am not only emboldened to present it, but even to hope that it may be regarded as worthy of the attention of those who listen to its reading to-night, and that, in its dissemination among many in this country in

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whose medical pupilage I have taken part, it may accomplish good.

The plan of treatment for that hydra-headed monster styled puerperal fever, which I shall advocate, has nowhere, so far as my knowledge extends, been fully elaborated in any one essay, and carefully systematized; the various portions of the plan are not yet even generally accepted as orthodox; and many appear at this late date to have paid little attention to them in practice, even if they have seen them in print.

In support of these assertions I will refer to these two facts: In the year 1879, at a session of the American Gynæcological Society in Baltimore, the question of intra-uterine antiseptic injection for the cure of puerperal septicæmia came up for discussion. It received very qualified approval, and, with one exception, if my memory serves me right, I stood alone in its strong and uncompromising advocacy. About a year ago I related, in a society of this city, the history of a bad case of puerperal septicæmia which was, beyond question, saved by the persistent and bold use of intra-uterine injections. This very desultory report was published in some of the medical journals of this city, and after its appearance I received a half-dozen letters from men at a distance in this country, asking how the injections were made, and other questions showing so great a want of familiarity with this valuable method that I became convinced that still another exposition of its merits might prove well-timed and useful.

Lastly, I would state that I was, if not the first, at least among the very first, who adopted the use of intra-uterine injections and cutaneous refrigeration, in the very inception of both plans in this country; that I have since then never ceased to urge them as valuable resources upon the numerous practitioners with whom I come in daily contact, as teacher, consultant, and associate; and that, for this reason, I trust my large experience in and present estimate of these methods may prove of some value.

Of all the great benefits which have, within the past

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quarter of a century, been conferred by the advancing science of medicine, in my opinion, none has been more important and more signal than that relating to the prevention and the cure of the febrile conditions incident to the puerperium. Even before the new era which has recently dawned upon this subject, the personal communicability of these dangerous affections was fully recognized, but it was left for the establishment of the germ theory of disease to render their extreme contagiousness fully appreciated; to impress the facts that, with proper precautions, prevention was within the range of possibility, and that treatment based upon the knowledge thus given us might be made effective, and, to a great degree, certain.

Ever since the days of Hippocrates, pathologists have striven earnestly to elucidate the phenomena of those diseases which developed in consequence of the process of parturition, and produced such lamentable results. Over two thousand years have elapsed since that time, and only now have we passed "out of the darkness into the light" in reference to the matter, for now it does really appear that we are beginning to understand the pathology of that group of affections styled puerperal fever. The views which were, during this long period, at various times advocated and more or less generally adopted, are thus enumerated by Hervieux * in his masterly and exhaustive treatise upon this subject:

The doctrine of suppression of the lochia; the doctrine of metastasis of the milk; the doctrine of inflammation of the uterus and peritonæum; the doctrine of a specific puerperal fever; the doctrine of uterine wounds as we have one after an amputation; the doctrine of a multiplicity of puerperal affections grouped under one common name; the doctrine of puerperal blood-poisoning.

Let us pause here and review the features in the condition of the puerperal woman which render her a prey to so many and dangerous disorders which spring up as consequences of utero-gestation and of parturition.

In the first place, her blood is in a condition of hyperi-

* "Traité clin. et prat. des mal. puerpérales," Paris, 1870.

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nosis—that is to say, it contains a great excess of fibrin. If it be drawn by the lancet, it presents the buffy coat, upon which our forefathers laid so much stress, in the most marked degree; and from this arise two liabilities—first, a tendency in such blood to form thromboses in the heart and the blood-vessels, and, second, a tendency to prove a most prolific ground for the development of sepsis and zymosis. Measles, scarlatina, and varioloid, which gave no very bad prognoses when they excite zymosis in the blood of the non-pregnant woman, commonly produce death when they act upon the blood of pregnancy.

Then the nervous system is in a plus state of sensitiveness and excitability, and influences which are very controllable in the non-puerperal state produce very evil results here. For example, an accumulation of urinary poisons in the blood produces convulsions; an untoward moral influence produces violent mania; and crude ingesta result in severe spasmodic affections in the alimentary canal which, in the same woman when not pregnant, would scarcely have attracted attention.

The local conditions which result from parturition are even more striking. The uterus and other pelvic viscera are, at full term, as fully supplied by lymphatics and lymphatic glands as is shown in this diagram;* and the arteries, veins, nerves, and other tissues of that organ, the vagina, the uterine ligaments, and the peritonæum have all undergone a rapid physiological hypertrophy, which permits of an organ only three inches in length ascending so as to touch the ensiform cartilage.

The uterus about the 280th day of gestation contracts and expels the child; then the placenta and membranes; and then closes its empty cavity, and rests. Let us suppose that in forty-eight hours after delivery a primipara dies of pneumonia, and that we are allowed to lay open the genital tract and examine it from the fundus uteri downward. Outside all looks well; the uterus is merely much larger than in the non-pregnant state. Within, it presents a very different ap-

* Here Dr. Thomas showed diagrams.

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pearance; the whole endometrium, covered over by the grayish, sloughy-looking decidua vera, presents all over its surface an unhealthy, unclean, and diphtheritic look, although free from exudation. Here and there shreds of membrane, consisting of small portions of the decidua reflexa, which had become adherent, appear, partially detached and somewhat decomposed. At one point the large placental site is seen, raw, irregular, and covered over by minute traces of the placenta and small blood-clots which close the mouths of the uterine sinuses. The odor of the opened uterine cavity, the walls of which are thus covered, is disagreeable. The substances mentioned have for forty-eight hours been dislodging themselves and mingling with the pinkish fluid which pours like an unhealthy sweat from the placental site, constitute what is called the cleansings, or lochial discharge. Upon examining the cervix uteri, we find two or three small rents which pass through the mucous lining and involve to a varying depth the sub-lying parenchyma. In consequence of these injuries, and of absorption through them of the lochial discharge already mentioned, the cervix is swollen and œdematous. As we examine the vagina it will be found that the great distention impressed upon it by the head of the child in its passage to the vulva has in two or three places caused a superficial rupture of the mucous lining of this canal.

We now arrive at the vulva, and here we find several solutions of continuity which have been effected by the escaping head. The fourchette has been torn through, and this rent has extended through a small portion of the perinæum, and one or two small fissures have occurred in the mucous membrane covering over the ostium vaginæ.

Were we to take some of the lochial discharge from the vagina, after the atmosphere has acted upon it, and, abrading the inside of the finger with a lancet so that it bleeds slightly, apply this freely to the denuded surface, and allow it to become dry there, its irritating character would soon become evidenced by a burning sensation in the part, a smarting extending up the hand, and on the next day signs of a

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slight local inflammation, with a little lymphangitis, would be noticed. This would probably last only two or three days—merely long enough to demonstrate the fact that the fluid is an irritating one, but not sufficiently poisonous to cause erysipelas or severe angeioleucitis.

The natural history of the ordinary local results of human parturition is given in the foregoing sketch. In every case of child-bearing the endometrium is thus incumbered and freed by a process of exfoliation and sloughing; in every case the cervix, vaginal mucous membrane, perinæum, and vulva are, in varying degrees, lacerated; and in every case the offensive fluid, called lochia, poisons these freshly made, unprotected wounds. And yet what are the usual results? Recovery, uniformly, I might say universally, unless some unusual occurrence manifests itself to prevent this happy consummation! Theorizing about the matter, one would suppose that the mortality resulting from such a state of things must be excessive. Here we have a number of recent wounds constantly and unavoidably bathed with a fluid made up of dead and decaying animal tissue in a woman whose blood and nerve states are, with reference to septic disease, like flax prepared for the spark, and who is exhausted by pain, anxiety, loss of blood, and deprivation of sleep. Can one point to any concatenation of circumstances better calculated to insure a bad result? And yet the facts are these: only about one or two in every one hundred parturient women ordinarily die when properly cared for during labor, even in public hospitals.*

Recovery, then, is the very general rule after normal parturition; death the very rare exception. Bnt now and then all this is changed. Some ferment or specific poison gains access to the genital canal and acts as rapidly and as decidedly as a little yeast added to dough. In the latter case, active and immediate fermentation affects the whole mass; in the former a set of striking, alarming, and often fatal phenomena occur, which spread dismay through the lying-in chamber and give an entirely new complexion to the prog-

* Tarnier, "Report of Maternité Hospital," Paris.

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ress of the case. The fact that this unfortunate occurrence has taken place will usually announce itself to the attending physician in this way: He leaves his patient on the morning of the third day cheerful, happy, free from pain, with a pulse of 85, and a temperature of 99°. He is called to her in the latter part of that day and finds that she has had a slight, perhaps a scarcely perceptible, chill; that some pelvic pain has followed it; that the lochia have ceased; that the milk which was just showing itself has disappeared; that a severe headache exists; that a look of indescribable anxiety has replaced the happy expression of the morning; that the pulse rate is 130 to the minute, and that the buccal temperature is 104°.

A poisonous element has by some method or other reached the genital tract, as fruitful a field for its activity as a mass of dough is for the yeast, and the result is already manifesting itself. Let us suppose that the patient's medical attendant lays the flattering unction to his soul that all this is due to "malaria"; or that he soothes his troubled mind with the hope that it is "milk fever"; or that, recognizing the attack as one of "puerperal septicæmia," or "blood-poisoning of child-bed," the first link in that terrible chain called puerperal fever, he relies upon medicines given by the mouth or rectum, what is usually the course shown as the natural one of the affection? Within a week, or thereabouts, for there is no rule as to this point, parenchymatous metritis, lymphangitis, lymphadenitis, phlebitis, cellulitis, or peritonitis will very probably develop itself, and what was originally merely a septicæmia will merge into one of these affections, and the patient will pass through the perils attendant upon whichever of these pathological states manifests itself as a consequence of the initial lesion.

Sometimes the septic disorder develops puerperal mania, while at other times a septic pleuritis, endocarditis, pneumonitis, pericarditis, or meningitis follows the systemic poisoning, the lymphatics emptying their deadly contents into the thoracic duct, and thus transferring them into the subclavian vein, as Lusk clearly points out. At other times the

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condition continues one of true and uncomplicated septicæmia to the end, death occurring from coma, or the patient succumbing to exhaustion from hyperpyrexia, which lasts for weeks. What was originally septicæmia, however, as a rule rarely remains so, but generally passes into some other disorder, and very generally into peritonitis, before a fatal termination occurs.

And now comes naturally the question, What is the pathology of that affection styled puerperal fever? An inquiry into the views which prevail among others would evidently require more time than I can possibly allot to it to-night; and yet I am desirous that my answer, even if very short, shall be so clear, succinct, and simple as to convey perfectly the opinion which a practice of thirty years has impressed upon my own mind concerning a subject which has always deeply interested me, and in connection with which I have had abundant opportunity for study, both at the bedside and in the dead-house.

My observations have led me to adopt the views of those who believe that *puerperal fever is puerperal septicæmia.* It matters not whether it assume the form of metritis, phlebitis, cellulitis, peritonitis, or lymphangitis, the essence of the disorder is a poison, which is absorbed into the blood of the parturient woman through some solution of continuity, and which, in the appropriate soil of the puerperal condition, fructifies and produces the result known in its *ensemble* of pathological phenomena as puerperal fever. From my stand-point, the matter is well stated by Lusk* when he declares that "it has now passed beyond the domain of dispute that puerperal fever is an infectious disease, due, as a rule, to the septic inoculation of the wounds which result from the separation of the decidua and the passage of the child through the genital canal in the act of parturition."

As early as 1870, Hervieux, in his work on the diseases of child-bed, already alluded to, expressed himself upon this point in the following words: "Here I stand; if what I have said does not carry conviction of the truth of my doc-

* "Midwifery," p. 608.

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trine, fuller explanation will fail to do so. I believe in the multiplicity of puerperal diseases. I believe in puerperal poisoning as the source of them. Here, in two words, my creed is presented."

In 1877 the Berlin Obstetrical Society appointed a committee on puerperal fever, consisting of Schröder, Löhlein, A. Martin, Fasbender, and Boehr—men whose names are sufficient to command attention, even if their words fail to carry conviction. In its report this committee expresses its views thus:* "Under the names 'puerperal fever,' 'malignant child-bed fever,' are included a group of diseases occurring in child-bed which vary very greatly in their manifestations, but have this in common, that they are called into being by the absorption from the organs of generation of a material which gives rise to destructive inflammation and fever. There are, indeed, a number of substances, mainly composed of organic materials in a state of putrid decomposition, which, when brought into contact with an open wound, set up inflammation in it, which extends to the neighboring tissues; a further absorption by the lymphatics and blood-vessels leads to more extensive inflammation among neighboring and remote organs; and, when a large quantity is rapidly absorbed into the blood, a quickly fatal poisoning of the whole organism occurs. To surgeons the deadly effect of these materials upon wounds is only too well known, and the greatest advance, probably, which surgery has ever made consists in the so-called antiseptic method of treating wounds—that is, in the scrupulously exact removal of such materials from fresh wounds.

"Puerperal fever is indeed nothing else than the infecting of fresh wounds, such as are found in every newly delivered woman, with these destructive septic materials. Almost every woman, after labor, has small wounds on the external genital organs, which are caused by the passage of the child through this narrow opening, and in every newly delivered woman the inner surface of the uterus, from which the pro-

* "Report of Puerperal Fever Committee of Berlin Obstetrical Society," December 4, 1877, p. 9.

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tecting membrane has been cast off with the ovum, presents a large wound surface. Thus, every newly delivered woman is liable to suffer from the dreaded infective wound diseases, which, in persons wounded under other circumstances, are called pyæmia, septicæmia, wound-fever, blood-poisoning, purulent infection, etc., *so soon as suitable septic materials are brought into contact with the genital organs.*"

And now a few words upon the nomenclature of this disease, which for so long has been known under the names of puerperal fever, child-bed fever, lying-in fever, and the names of the various special affections which develop in its course—phlebitis, lymphangitis, etc. Of late an effort has been made, which I think has emanated from that school of obstetrics which has shed so much luster upon our art, and enriched with so many eminent names the obstetric register of the world—the Dublin school. By members of this it has been urged that the name metria should supplant that of puerperal fever.

I for one sincerely trust that the suggestion will never be adopted. In what is the new name better than the old and faulty term? Does it convey any more accurate pathological facts to the minds of the students? Does metria exclude any chance of error as to pathology, or advance the clearness of understanding in any wise? I think not. Of the two terms it appears to me that, while both are objectionable, metria is the more so.

On the other hand, puerperal septicæmia conveys to the student and to the practitioner a clear and definite idea, which appears to be in consonance with the truth as taught us by modern pathology. In spite of the fact that important complications commonly result from the initial lesion, it appears to me that the influence of this is so paramount that its title should be adopted in spite of the fact that it is far from being absolutely perfect.

I should willingly, for the present, accept the reservation offered by Dr. Robert Barnes,* when he says: "I would propose that the word should not assume that a distinct,

* Lecture in "Am. Jour. of Obstetrics," January, 1882.

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specific poison, or sepsis alone, is concerned, but that it should be used comprehensively as a general term, implying that the blood of the puerpera is empoisoned;" and this although I do believe in the existence of a specific poison, which is the great factor, as surely as I believe in such a factor in the production of typhus or variola.

What is the nature of this subtle and deadly poison, which, entering like a ferment into the genital canal of the puerperal woman whose blood is hyperinosed, whose nerves are in a condition of hyperæsthesia, whose utero-placental vessels are partially open, whose cervix uteri, vagina, and vulva are covered with fresh superficial wounds, and whose womb is pouring slowly forth a fluid composed of dead tissue, decomposed blood, and recently exfoliated cells, gives rise to so much disturbance? What do we know of the poison? what is its natural history? what encourages its life? and what kills it, or cripples its activity?

Unfortunately, these questions cannot to-day be satisfactorily answered; but have such questions been any more satisfactorily answered with reference to scarlatina, measles, and varicella? German pathologists have proved that the presence of micrococci, more especially of the round bacteria, occurs so frequently in the pathological products of puerperal diseases as to lead to the conviction that they are important factors in reference to them; but this point, like many others connected with the influence of bacteria as morbific agents, is yet too unsettled for admission into a practical treatise like the present.* Inquiry into the matter is now being pushed with vigor in the laboratories of France and Germany, and we have, according to recent reports, a fair prospect of valuable and practical results.

But, even although we do not at present know the exact nature of the poison which proves the disturbing element in these cases, we surely know that some such toxic agent exists, and it behooves us to learn how to prevent its entrance

* In reference to this part of our subject I would refer those interested to the chapter upon it by Professor Lusk, in his masterly book upon the "Science and Art of Midwifery."

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into the genital tract, and how best to destroy its life or its activity if it should gain admission in spite of our care and watchfulness.

Whatever be the character of this agent, we know that there are *two, and only two,* methods by which it can reach the parturient tract and exert its baneful influence. First, it may be carried to the vulva and into the vagina through the open orifice of that canal by the atmosphere, in which it floats as an impalpable substance; and, second, it may be carried to any part of the genital tract by the fingers of doctor or nurse; by towels or cloths laid against the vulva; by sponges used in washing; by instruments used in the delivery of the child, drawing of the urine, or injecting the vagina; and from the bed-clothing and body-clothing of the patient which are in immediate contact with the sexual organs.

As this paper is already assuming proportions greater than those which I originally prescribed for it, I shall deal with this part of my subject rather dogmatically, offering a number of propositions which will embody in a few sentences what would otherwise demand a great deal of space for its enunciation. I shall address my remarks chiefly to the management of cases of midwifery occurring in private practice, as the wards of hospitals have long been subjected to systematic rules, while my observation in the capacity of consulting physician positively convinces me that in private practice, even among the wealthy who can command every safeguard and procure every luxury, there exist a want of system and an apathy as to preventive measures which border very closely upon criminality. To-day, when it is so generally agreed among the ablest obstetricians of the world that puerperal fever is the result of a special poison, and that prophylaxis against this is, by close attention to very simple details, perfectly practicable; it is the duty of every practitioner to guard his patient against danger by every means in his power. If he accept the views which this paper adopts, his duty is clear; it is equally incumbent upon

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him to give his patient the benefit of the doubt if he reject them.

Prophylactic measures which should be adopted in all midwifery cases, whether they occur in hospital or in private practice:

1. The room in which the confinement is to take place should have the floor, walls, and furniture thoroughly washed with a ten-per-cent. solution of carbolic acid or mercuric bichloride, 1 to 1,000, and the bedstead and mattresses should be sponged with the same solution. Curtains, carpets, and upholstered furniture should be dispensed with as far as possible.

2. The nurse and physician should take care that all their clothing, both under and upper, be clean and free from exposure to the effluvia of any septic affection. Should either of them have been exposed within a fortnight to the effluvia of such affections as scarlet fever, typhus, erysipelas, septicæmia, or the like, they should change every article of clothing and bathe the entire body, especially the hair and beard, with a reliable antiseptic solution; that which I prefer for this purpose is a saturated solution of boric acid.

3. As labor sets in, the nurse, having thoroughly washed her hands, cleaned her nails with a stiff nail-brush, and soaked them in antiseptic fluid, should administer to the patient a warm vaginal injection of antiseptic character; bathe the vulva and surrounding parts freely with the same; repeat this every four hours during labor; and keep a napkin, wrung out of the warm antiseptic fluid, over the genital organs until the birth of the child.

4. Before assuming the functions of their respective offices at the moment of labor, both doctor and nurse should wash the hands thoroughly with soap and water, *scrub* the nails with a stiff nail-brush, and soak the hands for several minutes in a bichloride solution, 1 to 1,000.

5. The first two stages of the labor having been accomplished, the third stage should be efficiently produced; all portions of placenta and membranes removed; and ergot administered, in moderate doses, three times a day, and kept

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up for at least a week, for the complete closure of the uterine cavity, expulsion of clots, and occlusion of the utero-placental vessels.

6. The doctor, taking nothing for granted, not satisfying himself with a vague report of the nurse, should, at the conclusion of the labor, carefully examine the vulva of the patient. If the perinæum be lacerated, it should be closed at once by suture, to shut up this avenue to septic absorption; and, should slight solutions of continuity be found in the labia or the vulvar extremity of the vagina, these should be dried by pressure of a linen cloth, touched with equal parts of sol. ferri persulph. and carbolic acid, again dried thoroughly by pressure with the cloth, and then painted over with gutta-percha collodion. If this be thoroughly done, absorption will be prevented at these points for at least three or four days, when the application may be repeated.

7. In six or eight hours after the labor, when the patient has rested, the vagina should be syringed out with an antiseptic solution, and a suppository of cocoa butter, containing from three to five grains of iodoform, should be placed within it, under the os uteri. A syringe with intermittent jet should be used, which will wash away with gentle force all blood-clots, and reliance should not be placed upon the feeble drip of the fountain syringe, the advantages of which are, I think, entirely theoretical.

8. These vaginal injections and suppositories should, in cases of normal labor, be repeated every eight hours; in cases of difficult or instrumental labors, twice as often; and they should be kept up for at least ten days, the nurse observing to the last the precaution already mentioned of washing her hands before every approach to the genital tract of the patient.

9. When catheterization becomes necessary, it is safer to employ a new gum-elastic catheter, which before use should be thoroughly immersed in antiseptic fluid, and which should be destroyed at the conclusion of the case, rather than to trust to the nurse's cleansing of an old silver instrument

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which bears within it the register of a list of cases of septicæmia in which she has employed it during the past two or three years. *It is a very common and very bad habit for nurses to own silver catheters, which they carry about with them from case to case of midwifery.*

10. Last, but by no means least, let the physician inform himself by personal observation as to the competency of the nurse to syringe out the vagina thoroughly, to place the antiseptic suppositories just where they should be, and to use the catheter without injury to the patient. Neglect of this precaution has frequently resulted in leaving a fœtid upper segment of the vagina entirely unwashed, while the antiseptic stream was limited to the lower third of the canal.

In a case in which I had performed anterior colporrhaphy and perineorrhaphy at the same time, in private practice, I was forced to withdraw my sutures and sacrifice the operations on account of a sudden rise of temperature to 105°. As I had become alarmed about the patient, I then used the syringe myself, and, to my great surprise and regret, found the upper portion of the vaginal canal filled with a decomposed mass of blood, which the constant but inefficient injections of the nurse had failed to remove.

Even if every suggestion made here be faithfully followed out in every case of labor which one attends in private practice, the trouble involved in the plan will not be great; and it will fall into utter insignificance when measured with the great comfort which will come to the mind of the obstetrician from the reflection that he has fully done his duty in exerting himself to the utmost to protect the vital interests which have been entrusted to his care. This feeling, which would be pleasant if no untoward event occurred, would be tenfold more so if a fatal issue should give rise to the painful inquiry as to his having fully acquited himself of his duty in respect to prophylaxis. In the past this unpleasant question has not been often raised, but, as society at large becomes more thoroughly informed upon the prolific subject of the germ theory of disease, it appears to me that he will stand firmest who can point to a clear record of strict attention to preventive medicine.

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It is clear that all this will make of the process of parturition in the future a more important event than it has been regarded in the past, and she who is about to bring forth will be treated as one about to go through the perils of a capital operation. This is just what I think ought to take place, and, when it does so, thousands of valuable lives which are now lost will be saved, and thousands of desolate households will be spared the sorrow of losing their female heads.

I am fully aware that, at the conclusion of this paper, more than one speaker will arise and declare that his experience of many years of large midwifery practice, with scarcely any deaths, convinces him that all these precautions are unnecessary, that the process of parturition must have changed its character, or that this magnifying the perils of a simple physiological process is a work of pure supererogation, which will have its day, and then forever pass away. I will simply say in advance to these speakers that I don't agree with them, and then quote the language of the Puerperal Fever Committee of the Berlin Obstetrical Society, in pressing the preventive measures of antiseptic surgery upon the Prussian government.*

"We shall not attempt to portray, from a humanitarian point of view, the anguish which falls upon the numerous families, where the wife and mother, who but just now was radiant with the full bloom of health, has been carried off, just as the family has been increased by a new member, still utterly helpless and dependent upon a mother's care; nor shall we point out what injury is done to the national life of the state by the yearly death of thousands of mothers, and the ruin of thousands of families caused thereby. We may fitly compare the manner in which puerperal fever finds its victims in a definite class of persons, with the losses which are entailed by a great war. Just as, in the latter case, the losses fall exclusively upon the young and vigorous male population, *so in the former is the most valuable part of our female youth carried off by puerperal fever;* nay, more,

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Op. cit., p. 8.

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the loss which the family and the state suffer in consequence of puerperal fever is more acutely felt than that which in general accompanies war, because the latter concerns usually the unmarried and only just full-grown young men. The loss of an entire battalion of *Landwehr* is the only one which can be fittingly compared, in the severity of its results and the intensity of distress which it causes, with the ruin which puerperal fever brings with it."

Before leaving this part of my subject, let me in the strongest manner record my protest against the use of intra-uterine injections as a prophylactic measure, except after very severe operations within the uterine cavity, which render the occurrence of septicæmia almost certain. As a preventive measure, to be uniformly adopted, I look upon it as to the last degree rash and reprehensible. The use of a dangerous remedy in combating the results of a dangerous disorder is always admissible, but a resort to a hazardous procedure for a condition in connection with which danger has not shown itself, and may not do so, should be viewed in quite a contrary light.

TREATMENT OF PUERPERAL SEPTICÆMIA.

Let us now suppose that, in spite of every precaution, the specific poison has gained entrance at one of the numerous door-ways left open in the genital tract between the vulva and the fundus uteri; what are the most reliable means now known to us for checking the advance of the septic disorders which are set up in consequence?

But let me stop here, before answering the question just asked, and explain what I mean by the use of the term specific poison. I do not believe that there is, necessarily, any specific disease germ which gives rise to *puerperal* septicæmia! It is probably the same germ as that which is the source of septicæmia, phlebitis, and lymphangitis in the stump after an amputation, in the wound created by a compound fracture, or in the lacerated tract produced by a gunshot. But the pathological condition excited appears to me to be entirely different from that putrid absorption which

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results from the decomposition of a retained placenta, or a putrid mass of blood. Such decomposition produces a toxæmia, violent and dangerous it is true, but which disappears as soon as the offending mass is removed. That of the true puerperal disease at once, or almost at once, diseases the lymphatics and sets up an action which often proves uncontrollable. *If the mere presence of decaying animal material in a uterus would produce puerperal septicæmia without the agency of specific disease germs, we should surely have that affection developing in healthy country localities where the women are attended by ignorant midwives, but where, nevertheless, it is almost an unknown disorder.*

"I," says Hervieux, "who write these line, declare that in my own country I have within the space of three years attended one thousand cases of labor, and out of that number have lost only one patient!"

And now, in summing up what I esteem the most certain and the most rational treatment of the disease styled puerperal fever, I will be as concise as possible.

As soon as the patient is stricken by the poison, certain very marked phenomena usually develop themselves with great promptness. After a chill or a slight horripilation she is affected by a high temperature, pelvic pain, considerable mental perturbation, headache, pain in the back, and sometimes, though not commonly, by nausea and vomiting. We will assume, first, that the attack is a severe one in its inception; and, second, that the patient is in such a position in life that we are not in any way hampered in our efforts to save her by considerations of economy. Having considered treatment from these standpoints, it will, of course, be easy to modify the plan so as to meet the requirements of a mild attack or of a scanty purse.

As the practitioner sits by the bedside of his patient at the commencement of her attack, he is aware that there are points connected with its true pathology which he can not yet determine. For example, he cannot say whether the case is going to assume the form of septicæmia lymphatica or septicæmia venosa; whether of perimetritis or parametri-

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tis; or whether thrombosis of some of the large pelvic or utero-ovarian vessels or a true parenchymatous metritis is to play the most active part in the siege which has begun. If he fritter away the golden moments in vague speculation; if he soothe his fears by hoping that the attack is due to malaria or milk fever; or, if he cast aside the rational doctrines of to-day in favor of the idea of a general infectious and particular form of disease called by the forefathers of the French school "*la fièvre des femmes en couche*," time will be lost which can never be regained. If, on the other hand, he is encouraged by his clinical observation to stand with many of the best pathologists and practitioners of our time in the position assumed by Hervieux—"I believe in the multiplicity of the affections classed under the head of puerperal fever; I believe in puerperal poisoning as the source of them"—he will act at once and strike at the poison before it has fairly gained a foothold. In other words, if the physician could see into the future and learn with certainty that peritonitis, cellulitis, thrombosis, lymphangitis, or true phlebitis is to be the final disorder, he should, if he reaches the case at the inception of the attack, follow, in my opinion, the course here formulated:

1. As soon as a diagnosis of septicæmia is determined upon, all pain, nervous perturbation, shock, and mental anxiety should be quieted by the hypodermic administration of ten minims of Magendie's solution of morphine, unless some special and very decided idiosyncrasy with reference to opium be ascertained to exist; and throughout the severity of the attack, whenever suffering of mind or body occurs (perhaps it will be about once in every six or eight hours), this should be repeated. In my experience, no other method of administering morphine in these particular cases compares with this, and, as it is not to be continued long, there is no fear of causing the patient to become addicted to the drug as a vice. If a small, sharp, and *new* needle be used, if it be thoroughly cleansed with soap and water before each time of using, and be dipped in a solution of bichloride, 1 to 1,000 of water, just before each insertion, no abscesses will occur.

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It is the large, rusty, unwashed, and unpurified needle, which the doctor's economy makes last him for many months, which so commonly results in them.

2. The physician must now decide whether, in his opinion, the septic disease which is developing has originated in the wounds situated between the os internum uteri and the vulva, or in the endometrium, above the former point. If he decide in favor of the former view, he should persist, for a time longer, in the more thorough use of vaginal injections; if of the latter, intra-uterine injections should be at once resorted to. Usually the question has to be decided by the efficacy or inefficacy of frequent germicide vaginal injections in bringing down the temperature and controlling other grave symptoms. Should a failure of these seem to prove that the origin of the disease is higher up the genital tract, more decided and radical measures must be taken.

The patient having been entirely relieved of pain and thoroughly quieted, the first injection should be practiced in this way: An india-rubber cloth should quietly, without hurry, noise, or disturbance on the part of the nurse, be spread over the edge of the bed on which she lies, and made to fall into a tub of warm water rendered antiseptic by the addition of 2 or 2½ per cent. of carbolic acid, or of the bichloride of mercury, 1 to 2,000, or of some other reliable germicide. Then Chamberlain's glass uterine tube, which I here show, or the very excellent and ingenious tube invented by Dr. George H. Lyman, which is here seen, thoroughly fitted to a Davidson's or Higginson's syringe, should be immersed in the tub. The nurse now aiding the patient by the shoulders, and the doctor by the hips, she should be gently laid across the bed and be made comfortable with a pillow under the head. Each foot should rest upon a chair placed at either side of the tub, and she should be entirely covered over with a couple of blankets. The doctor, now placing himself between the knees of the patient, should take the tube in his right hand, while a stream of water is made to flow through it by the nurse, who squeezes the syringe bulb; and he should pass it gently up to the fundus

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of the uterus. The stream of water which has been steadily flowing, is now projected with gentle force against the walls of the uterus, washing away adherent blood-clots, detaching portions of hanging membrane, and everywhere neutralizing the influence of the poison which has excited the disorder.

After the first injection, the position of the patient need not be disturbed, but the injections may be given as she lies upon a bed-pan.

In some cases, in which I have had reason to suspect that portions of the placenta or membranes have been retained, I have chloroformed the patient, passed the hand, rendered thoroughly aseptic, within the cavity, and very gently scraped off adherent masses from the uterine walls, using the nails as a curette, as Wilson, of Baltimore, has advised. In some other cases I have rubbed the whole endometrium with an aseptic sponge, held in a long sponge-holder, or employed the largest of my curettes, to remove clots and adherent secundines, with great apparent advantage.

That the use of antiseptic uterine injections after parturition is attended by danger is beyond question. The greatest hazard attending this plan is the entrance of air into the uterine cavity; the next, the production of hæmorrhage by detaching some of the thrombi which fill the mouths of the uterine sinuses; the third, the danger of forcing the fluid used as an antiseptic directly into the general circulation, through the introduction of the tube into the mouth of a sinus; the fourth, the creation of convulsions, violent pain, or nervous prostration, by a sudden and baneful influence upon the nervous system; and the fifth, the passage of the tube into a Fallopian canal, and the injection of fluid directly into the peritoneal cavity, as in a case reported by Dr. W. Gill Wylie in an interesting paper in the "New York Medical Journal" for June 23, 1883, p. 679.

All these dangers may be, to a great extent, avoided by care as to details: by using a large injecting tube which cannot enter an open-mouthed sinus; by using water warmed to 105°; by injecting the fluid through the tube so as to exclude air before passing this up to the os uteri; by using

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only a moderate degree of force in throwing the jet against the uterine walls; and by proceeding with the whole affair gently, cautiously, slowly, and intelligently.

The tube should never be allowed to fill the os uteri completely, so as to prevent the escape of the injected fluid. Should the cervical canal be so narrow as to hug the tube closely, it should be dilated by dilators of hard rubber, by the fingers, or by Barnes's bags, before the injection is practiced.

A solution of the persulphate of iron should always be at hand in case of sudden hæmorrhage from displacement of a thrombus. Should this accident occur, ergot should be immediately given hypodermically, the iron solution be at once added to the antiseptic solution and allowed to pass into the uterus, and pressure be made upon the fundus so as to stimulate the contractions of uterine fiber to accomplish closure of the open sinuses in that way.

Quite a number of cases of death from this plan of treatment are on record. In a very large experience with it I have met with but one. The whole number on record would, however, fall, I think, into insignificance if weighed in the balance against the many deaths which have been due to a neglect of the means, or against those lives which have been saved by it.

After all, the question as to the dangers attending a plan of treatment are not to be settled upon mere abstract reasoning. The evil which it is known to do must be weighed in one scale, and the good which it effects in another; and careful consideration must decide whether we are justified in accepting the former for the sake of the latter. Judged in this manner, I feel very sure that intra-uterine injections for puerperal septicæmia deserve a place among the most valuable resources for the saving of life for which we are indebted to modern pathology.

The frequency of these intra-uterine injections should vary greatly with individual cases. In mild cases of septicæmia where the temperature comes readily down after the uterus has been washed out, and rises very slowly, they need only

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be used once in every five hours; in other cases they become necessary once in every three hours; and in bad cases they are required once every hour. These injections should always be administered by a physician, should always be carried fully up to the fundus uteri, and should always be used with every regard to caution as to detail which has been already mentioned.

Many prefer the use of those syringes which allow of a steady flow of a stream of water, propelled by gravitation, as is the case with the so-called fountain syringe, which is so popular among us. This is partly because greater safety is supposed to attach to these, and partly from a theory that danger attends the propulsion of a stream by intermittent jet against the uterine walls. For a number of years I shared this belief, but experience has taught me that a gentle projection of the fluid is an advantage, that by this means a more thorough cleansing is accomplished, and that with due caution no more danger attends the plan than that by the steady flow.

Some have adopted continuous irrigation of the uterine cavity, but this is, I feel perfectly certain, a delusion and a snare. It gives the appearance of great thoroughness, which it does not possess, for the reason that by this plan it is very difficult to bring the germicide fluid into full contact with the entire endometrium. For vaginal irrigation it is an excellent method, but I have seen it allow the temperature to remain high when applied to the uterine cavity, and have replaced it by the intermittent douche, used only as often as every three hours, with striking results. Nevertheless, in very severe cases I prefer to employ continuous irrigation, replacing its use every third hour by that of the intermittent current; rather than exhaust my patient by half-hour disturbances and injections, as has been by some advised.

After all that has been said on this subject, the essential fact is this: that plan is best which accomplishes most perfectly the cleansing of the parturient canal. With ordinary precautions, danger need not necessarily attach to any method.

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3. The uterus having now been thoroughly cleansed, and the patient entirely quieted, attention should be turned to controlling the temperature, which, in septicæmia of puerperal character, runs so high and maintains itself at so exalted a range as to constitute one of the immediate factors of a fatal issue. Even if this were not the case, the patient's strength is so much exhausted by prolonged high temperature, her nerve power so much depreciated, her blood-state so rapidly injured, and her comfort so decidedly interfered with, that these considerations alone would point to the propriety of combating hyperpyrexia. For this purpose I formerly relied upon the affusion of cold, or tepid water, the patient lying upon Kibbee's cot; at present I accomplish the same result more easily and more pleasantly for the patient by the use of Chamberlain's rubber-tube coil, which I here show. A mat, composed of a rubber tube rolled upon itself in a circle, covers the whole abdomen from the ensiform cartilage to the symphysis pubis; the upper end of the tube which makes this mat is anchored by a weight in a tub of ice-water, placed about three feet above the level of the patient, and the lower end falls into a tub upon the floor. By siphon action the water of the elevated tub runs through the tube which constitutes the mat, and collects in the receptacle on the floor. By this means a temperature of 104° can very readily, as a rule, for there are exceptions to the rule, be kept at 100° for weeks together.

Unfortunately, there are almost insurmountable difficulties connected with the use of this invaluable method in the minds of the patient's friends, the patient herself, the nurse, and alas, too often, the attending physician. You are told that the patient becomes chilled, that the coil prevents her resting, that the temperature absolutely goes up under its use, and descends whenever it is left off; and by the doctor you are apt to be informed that his fear of resulting pleurisy, bronchitis, or pneumonia is very great.

I will merely say, in refutation of these charges, that in my service in the Woman's Hospital, where convalescents from laparotomy are constantly under treatment in large

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numbers, this means of controlling temperature is as commonly and as freely in use as poultices are in general hospitals, or gargles in dispensaries for diseases of the throat. We never meet with any of these difficulties, and very rarely with failures as to the desired result, and I believe that I am correct in saying that successive house-staffs, whose duty it has been to carry out the plan, have thus far had, to a man, the most implicit faith in its beneficial agency.

There are some peculiarities about it, however, which I must mention. Very often the coil will not succeed in controlling the temperature for twenty-four hours; its prolonged use alone develops and illustrates its great benefits; and removing it from the body for an hour at a time damages its influence very much. I have never seen evil result from the chilliness which it excites, if hot bottles be kept at the soles of the feet, and in not one instance, out of hundreds of cases, have I seen pneumonia or pleurisy excited by it.

4. The nervous system should be so kept under the influence of febrifuge medicines as to keep under control the tendency to chill and pyrexia. For this purpose, fifteen grains of the sulphate of quinine should be given in capsule or by suppository night and morning, or, in place of this, two capsules may be given night and morning of Warburg's tincture, in the form of solid extract, as advised by Dr. J. T. Metcalfe. Lastly, to the same end the salicylate of sodium may be employed.

5. The patient's diet should consist entirely of fluid food, given often and in small amounts. The staple article should be milk, but animal broths and gruels may be alternated with it with advantage.

6. At the very commencement of such a case the attending physician should, in the patient's interest, surround himself with efficient and abundant assistance. If he undertake to wash out the uterus every four or five hours without other assistance than that of the nurse; and if the patient is to rely for the constant attention and care, which she will inevitably require, upon one nurse, it is needless to point out that the duty of both doctor and nurse—vital duties, be it re-

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membered—will be but half performed. And, unfortunately, the penalty will fall upon the patient and her friends.

For a case of puerperal septicæmia to be properly treated in private practice by the plan here advocated, it is necessary for the attending physician to associate with himself some young practitioner, who has the time to devote to the case, and the intelligence to use the uterine douche safely and efficiently. Furthermore, two nurses are necessary: one to be in charge for twelve hours, and the other then to relieve and replace her for an equal time. Without the rest and sleep thus afforded, no nurse taking charge of such exacting cases as these can possibly do her duty in such a way as to subserve the patient's interest. As a rule, the nurse will begin with the declaration that she is competent and willing to take entire charge; that she is one of those people who can do without sleep, etc.; and her heroic offers of self-sacrifice are hailed with enthusiasm by the terrified family. To believe in, and to act upon, this would be very foolish and very dangerous. After three nights of watching, this same nurse would snore through the hours in which her patient needed her, give the wrong medicines, mislead the doctor, allow the bladder to become distended with urine, and fail in every requirement of the occasion.

If the patient cannot bear the great expense attendant upon the extra service which I have mentioned, it is her misfortune; and for such as herself the doors of our hospitals are open. There is no case of ovariotomy in the Woman's Hospital, however poor the patient be, upon which, thanks to the generous arrangements of its managers, just such attendance as I have mentioned is not lavished.

The antiseptics which have heretofore been tried under these circumstances are thymol, boric acid, salicylic acid, carbolic acid, and mercuric bichloride. Of these, all have disappeared before the superior merits of the last two; and carbolic acid, which for so long a time has been almost supreme, appears about to be abolished in favor of the bichloride of mercury, 1 part to 1,000 or 2,000 of water. For all antiseptic purposes outside of the uterus, the bichloride

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is now, owing to the carefully made and important investigations of Koch, very generally employed in the strength of 1 to 1,000, and the uterus has now been washed out with this excellent germicide, 1 to 2,000, often enough to make us regard its use as an intra-uterine injection as entirely warrantable. If carbolic acid be used in that way, it will not be safe to carry its strength beyond a two-, or, at most, a two-and-a-half-per-cent. solution.

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THE PREVENTION AND TREATMENT OF PUERPERAL FEVER.*

BY FORDYCE BARKER, M.D., LL.D.,

PRESIDENT OF THE NEW YORK ACADEMY OF MEDICINE.

DURING the five years which I have had the honor to occupy this chair, I have never before seen a meeting of this Academy so enthralled by the charm of elocution, the fascination of rhetoric, the glow of conviction, and the air of one who speaks by authority—an air which can never carry weight unless it has been before fairly and justly earned by good work—as on the evening of December 6th, when the paper was read on "The Prevention and Treatment of Puerperal Fever."

Its authoritative tone, its earnestness and sincerity, its coloring of being based on experience and observation, instead of being unconsciously deduced from preconceived theory, give the paper such a plausible air of scientific truth as must secure its acceptance without question by many minds whose belief rests on authority, without examination of the data or analysis of argument. The more eminent the author of errors, which may dangerously influence medical practice, in matters of such vital importance as the saving of life of those who have just become mothers, the more striking the literary excellence and the more admira-

* Read before the New York Academy of Medicine, February 7, 1884, at the adjourned discussion of the paper on this subject by T. Gaillard Thomas, M.D., which was read before the Academy, December 6, 1883.

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ble the artistic merits of a paper promulgating such errors, the more necessary it is that such errors should be boldly met and promptly refuted. Any paper read before this Academy, by one to whom all concede a place among the most eminent in the department of the profession to which his life has been devoted, if allowed to pass without examination and discussion, will be accepted by great numbers in all parts of the country as a statement of the science and medical practice as enunciated by the most prominent men of the period. It is therefore a duty to carefully examine those novelties in doctrine and in practice which are brought here, and subject them to the test of the advanced science of the day and the accumulated experience of the past.

I will mention one other reason which has had a strong influence in overcoming my reluctance to do this work, and that is in the interest of the Academy.

In view of some past controversies outside of the scientific aims of this body, it seems to me desirable and important that the profession at large should understand that in this hall there can be the strongest antagonism in scientific doctrines and in questions of practice, and the keenest encounters in intellectual gladiatorship, carried on with all the courtesy of the duello, without individual hostility or the interruption of personal friendship.

I think most present know the great reluctance which I have to writing, especially the mechanical part—and that other engrossing work leaves me little time for this, except what should be passed either in rest or in recreation, and will therefore thoroughly appreciate the great reluctance with which I have undertaken the duty.

All will agree that the paper was remarkable for its originality, in that some of its pathological doctrines and the practice inculcated for the prevention and treatment of puerperal fever have never been taught in any work on obstetrics, or by any writer of acknowledged repute. If they are accepted by the common intelligence of the profession, they will assuredly be found in the obstetrical works of the future.

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As there are many others who will take part in this discussion, whom all will be anxious to hear, and as the author of the paper is entitled to all the time he may wish to close the debate, I shall, in the most concise language consistent with clearness of statement, give my reasons for thinking that the whole tone and coloring of the paper are misleading and dangerous, because it is supersaturated with septic infection. I would not "speak disrespectfully" of puerperal septicæmia. I believe it to be one of the most dangerous incidents which may occur to women after childbirth, and I trust that it will not be regarded as indelicate if I allude to the fact that in a work on puerperal diseases, published more than ten years ago, a lecture devoted to the consideration of this subject in all its relations fills thirty-seven pages. With the most anxious desire to correct any errors of opinion, and to accept any new views which progressive science or increased and more accurate clinical observation have demonstrated to be true, I have yet found no reason to make any essential change of the views expressed in that lecture.

In the paper which we are now to discuss, the author distinctly avows his belief, without any qualification, that "puerperal fever is puerperal septicæmia," and that "it matters not whether it assume the form of metritis, phlebitis, cellulitis, peritonitis, or lymphangitis, the essence of the disorder is a poison, which is absorbed into the blood of the parturient woman through some solution of continuity." Not only the sentence quoted, but the whole tenor of the paper must convey to the unbiased mind that it is the well defined opinion of the author that metritis, phlebitis, peritonitis, and cellulitis are never seen in the puerperal woman except as the result of an initial lesion, which permits the absorption of a specific poison through the parturient canal, either from the atmosphere—or from direct infection by doctors or nurses from neglect or carelessness —or other agents brought in contact with the sexual organs.

The tendency to this pathological view has been rapidly growing within the past few years, as a result of the enthusi-

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astic interest excited chiefly by the important investigations of our German co-workers, who have so zealously studied the character and effects of the micro-organisms in puerperal women *in hospitals*. In several of the most recent and the most excellent systematic works on obstetrics I have observed that nothing is said of the various local phlegmasiæ which are liable to arise in puerperal women as a consequence of parturition, and that they are only alluded to in connection with the subject of septicæmia. This seems to me a very grave omission, which must seriously embarrass young obstetricians, who consult these works for information when normal convalescence is interrupted by any of the local inflammations. No one, as yet, has maintained that the process of parturition and the puerperal state exempt a woman from those causes which induce local inflammation in the non-puerperal, or will deny that the process of parturition, and other attendant conditions besides the absorption of septic poison, may be the efficient cause of local inflammation; and I here state my conviction that in private practice, when there is no epidemic influence, twenty cases of local inflammation, due to such causes, will be met with where one will be found due to septic absorption.

It is hardly necessary to say, as I have before expressed the same opinions in a work published some years ago, that I am in entire accord with the author in his preliminary remarks as to the peculiarities in the system of puerperal women. I suppose that all educated men now know that the blood of a pregnant woman is in a state of hyperinosis, and that, as a rule, "her nervous system is in a plus state of sensitiveness and excitability, and influences which are very controllable in the non-puerperal state produce very evil results here." But it is very evident that in certain points our opinions are wide apart. He regards certain conditions, which always are found following normal labor and always occur in normal puerperal convalescence, as pathological, but which I believe to be purely physiological.

The ancients believed in the poisonous nature of the menstrual fluid. Pliny describes the menstrual fluid as a "fatal

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poison—which corrupts and decomposes urine, deprives seeds of their fecundity, destroys insects, that it blasts the garden flowers and grasses, and causes fruits to fall from their branches."

I had supposed this superstition to be extinct until informed by a letter from my friend, Dr. Weir Mitchell, that he knew "old men who would not permit a woman to enter their wine-room, for fear that, if menstruating, it would injure their wines." He also informed me that "in Roquefort women are not allowed in their cheese cellars." I suppose the theory must be that menstrual bacteria will destroy the bouquet of the Roquefort cheese.

But on the evening of December 6, 1883, in this Academy of Medicine, I first heard the full evolution of this doctrine clearly enunciated. The lochia are described as an offensive fluid, made up of dead and decaying animal tissues, which poisons freshly-made unprotected wounds. I quote textually two paragraphs:

"In every case of child-bearing the endometrium is thus encumbered, and freed by a process of exfoliation and sloughing; in every case the cervix, vaginal mucous membrane, perinæum, and vulva are, in varying degrees, lacerated; and in every case the offensive fluid, called lochia, poisons these freshly-made, unprotected wounds."

Again the writer says: "Here we have a number of recent wounds constantly and unavoidably bathed with a fluid made up of dead and decaying animal tissue in a woman whose blood and nerve states are, with reference to septic disease, like flax prepared for the spark, and who is exhausted by pain, anxiety, loss of blood, and deprivation of sleep."

Other quotations might be given of a similar tenor, and the prophylactic measures, which he asserts "should be adopted in all midwifery cases, whether they occur in hospital or in private practice," are based mainly on this theory. Can it be true that the process necessary for the birth of the human race is always attended with the development of a deadly poison whose malignant effects must inevitably prevent the spontaneous and kindly healing of such little

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traumatisms as always result from the process, and that, therefore, it is the duty of the accoucheur to take preventive measures of the character proposed? Does every parturient woman, in performing the function of maternity, like the scorpion,* that carries in its tail an agent for suicide, if death is threatened by fire, physiologically generate an equally fatal poison in a corresponding locality, which the obstetrician must guard against by means that are most inconvenient, alarming, and not altogether free from danger!

I do not intend now to examine the question, which I have before discussed very thoroughly, and my views have long been published, whether there is not a distinct disease, most appropriately denominated puerperal fever, when, if there be any septicæmia, it must be a consequence of a primary disease, and not a cause. Nearly a hundred years ago the eminent obstetrician of London who succeeded Denman, Dr. John Clarke, wrote as follows in regard to puerperal fever: "Unfortunately, the uniformity of the disease was assumed, and each author erected his own experience into a standard, by which to judge of the descriptions and the practice of others." This observation, which I read early in my professional life, made a strong impression on my mind. I trust that it will not be deemed egotistical if I say that it

* The late Professor William H. Van Buren used to narrate that, when a surgeon in the army and stationed in Florida, he had often seen the soldiers amuse themselves by placing a scorpion within a circle of fire. After vain and frantic efforts to escape, it would stop, strike its tail into its head or body, and instantly die.

Byron refers to these insect Catos in the following lines:

"The mind that broods o'er guilty woes
Is like the scorpion girt by fire,
In circle narrowing as it glows,
The flames around their captive close,
'Till, inly scorch'd by thousand throes,
And maddening in her ire,
One sad and sole relief she knows:
The sting she nourished for her foes,
Whose venom never yet was vain,
Gives but one pang, and cures all pain,
And darts into her desperate brain."

—*The Giaour.*

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had great influence on my mind during the twenty-five years that I was engaged in teaching medical students, as I felt strongly the responsibility of the position, and that I should be culpable negligent in my duty if I simply gave the results of my own observations, or the opinions of a limited number of observers, or the theories of a few popular authorities, but that I was bound to give the sum of the knowledge which had become a part of the common stock of the profession. For reasons which will be obvious, I felt this more strongly in regard to puerperal fever than any other subject which I had to discuss either before medical students or in medical societies. More has been written on this than on any one disease. It has been a terribly fatal disease in lying-in hospitals in all the great cities where such hospitals are found. It has been fatal as an epidemic in rural districts, where within a certain area every woman in a sparsely settled population, who gives birth to a child, for a certain limited period is affected, and a large proportion die. I could refer to very many published reports of such epidemics which have occurred in villages and towns, where for twenty-five or thirty years previously not a single death has occured in childbirth except from the casualties of labor, such as rupture of the uterus, hemorrhage, and convulsions.

All we know of any disease is derived from the study of its ætiology, its clinical phenomena, and its anatomical lesions. The epidemic disease to which I have just referred differs in all characteristic points from what is known as septicæmia. It differs in its origin, its modes of attack, its symptoms, and its anatomical lesions. The symptoms are frequently manifested a day or two before or even during labor, even when the child is subsequently born alive. In septicæmia the symptoms are never observed before or during labor, except when the fœtus is putrid. The former disease, puerperal fever, originates from epidemic causes, and from contagion and infection. The latter, from nosocomial malaria, from autogenetic infection, and from direct inoculation. Can a woman after childbirth be exposed to the danger of receiving the poison which produces septi-

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cæmia in larger doses than when she has retained in her uterus a portion of putrid, decomposed placenta? Yet I do not believe there is a single person who has had considerable obstetric practice for twenty years who has not had more than once to remove portions of putrid placenta which has been retained for days, and the patient has had no disturbance of such severity that he would call it puerperal fever. In the Texas "Courier-Record of Medicine," December, 1883, Dr. H. C. Ghent, of Belton, Texas, gives an amusing report of a case to which he was called three days after labor. She was attended during labor by an ignoramus, who appears to have used considerable force, and probably made some efforts to extract the after-birth. The patient, before he left, called his attention to something like a cord protruding from the vagina, which he said would, perhaps, come away by piecemeal. On his visit the next day, he at first said that a protrusion from the vagina was a false conception, but afterwards pronounced it a falling of the womb, which after a considerable length of time, he succeeded in replacing, and had the anxious husband engaged for twelve hours in constructing an abdominal supporter. On the third day, Dr. Ghent removed a large portion of the placenta and membranes, a putrid mass, with a stench which "was about as much as an ordinary pair of olfactory nerves could well bear." The patient had a quick pulse and high temperature, but the constitutional disturbance was easily allayed, as it seems that a "few thorough washings with hot carbolized water" was all the treatment required.

Before leaving this part of the subject now under discussion, I will briefly allude to one other point, which strikingly illustrates the difference between puerperal fever and septicæmia. I think there can be no doubt that the majority of the profession believe that all those causes of nosocomial malaria, such as aggregation, bad ventilation, contact with septic material, etc., which have a tendency to induce septicæmia in surgical cases, have an equal tendency to develop the disease known as puerperal fever in women recently confined. But this does not prove that the diseases are

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identical, for I think there is abundant evidence that, while these causes are always requisite for the development of surgical septicæmia, puerperal fever may be a very epidemic when these causes are wholly wanting.*

In the early months of 1873 puerperal fever prevailed in the best parts of the city, and in that class of society possessed of abundant means and living under as good sanitary conditions as are possible in any large city, to a degree and extent here unknown for the previous twenty-five years. The deaths from this disease in the hospitals and in the wards of the city where the poor are aggregated were much fewer than in many former years. In five of the best wards of the city, in which are the residences of a great proportion of those of wealth, and few of the class of dwellings known as tenement-houses, with a populption of 307,046, there were 80 deaths from puerperal fever, while in the remaining wards of the city, with a population of 605,245, there were but 63 deaths. In other words, I may say that during this period, in those wards of the city where the causes of septicæmia must have existed in the greatest abundance, the mortality was nearly one-third less from puerperal fever, in proportion to the population, than in the best parts of the city, where these causes of septicæmia could have existed only in a very limited degree.

I have good cause to remember this epidemic, as the excessive work, mental strain, and loss of sleep which it brought upon me, as my medical friends know, affected my health to a degree that required nearly six years for perfect recovery. I saw ninety-five cases during this epidemic, of which nineteen were fatal. Most of the latter I believe to have been fatal in their character from the history which I received, and I only saw them once. I had three cases in my private practice, in one of which the patients died. After this, most of the ladies whom I had engaged to attend, by my advice, went out of town for their confinement, and all these had normal convalescence.

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* See "Puerperal Diseases," by Fordyce Barker, Appendix, p. 515.

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From all these considerations, I think that if all the knowledge of this disease be derived from authors who have studied it in hospitals exclusively, it will be limited and one-sided, and the deductions, both as to its pathology and as to its treatment must in many instances be erroneous and unsafe. Especially must this be the case with those whose well-deserved eminence as operators compels them to be brought in frequent contact with surgical septicæmia and to witness the terrible results which this produces after the most skillful peformance of such operations as laparotomy and ovariotomy. Indeed, one can hardly understand how such a surgeon, who accepts the theory and believes in the necessity of such a prophylaxis and such treatment as is insisted upon in the paper under discussion, would ever dare to enter the room of a puerperal woman.

There are many other details in this connection which I am tempted to discuss, but these will doubtless receive due attention from the speakers who will follow me. I will, therefore, content myself by expressing an opinion which will surprise many who have been carried along by the popular wave of the septic theory as the initial cause of most of the puerperal diseases. My conviction is strong, based partly on individual experience, but chiefly on a careful study of the clinical midwifery reports of private practice and all the literature of the subject in my possession—and this is very full as regards the English and French languages—that, outside of hospitals, less than two per cent. of the puerperal diseases and not half of one per cent. of the deaths after childbirths are due to septicæmia. There are no statistics of private practice which demonstrate the error of this opinion. The belief of the septicæmists that terrible danger threatens every woman in childbirth is based wholly on theory. Because the maternal system has certain peculiarities differing from its normal condition—because the lochia are a poisonous fluid—and because there is always a certain amount of traumatic lesion in the parturient canal following parturition, every child-bearing woman incurs a most hazardous risk. This is a blunt statement of the argument and its deductions.

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I do not care to summon in support of the opinion that I have just expressed any higher authority, even if it were possible to do so, than the writer of the paper which we are now discussing and from which I make the following quotations:

"And yet what are the usual results? Recovery, uniformly, I might say universally, unless some unusual occurrence manifests itself to prevent this happy consummation. Theorizing about the matter, one would suppose that the mortality resulting from such a state of things must be excessive."

. . . . . .

"And yet the facts are these: only about one or two in every one hundred parturient women ordinarily die when properly cared for during labor, even in public hospitals."

Now if we recall the fact that a large proportion of deaths from childbirth result from the casualties of labor, such as convulsions, rupture of uterus, hemorrhage from placenta prævia, nervous shock, etc., it will be seen that the belief which I have expressed differs but slightly, if any, from his. I certainly find it much more agreeable to refer to our points of agreement than our points of difference.

The limit of time which, in justice to others who follow, I have allowed myself, will permit but a very few remarks on "the prophylactic measures which should be adopted in all midwifery cases, whether they occur in hospital or in private practice," as the author of the paper distinctly avows. If "she who is about to bring forth" must "be treated as one about to go through the perils of a capital operation;" if all those preparations, so definitely enumerated, which gynæcological surgeons insist upon previous to an ovariotomy or a laparotomy, are necessary in ordinary labors; if the danger from child-bearing be so great that a wise and prudent obstetrician is justified in subjecting his patient to the hazardous depression of intense anxiety and fearful doubt as to results, and in surrounding her with the vivid apprehension of her family, instead of stimulating and cheering her with the great happiness of maternity and the hope of increased interest and love from her husband;

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if all or even a considerable part of the details mentioned are necessary "to save thousands of lives which are now lost," and to spare "thousands of desolate households the sorrow of losing their female heads"—then it seems to me evident that the State should make child-bearing a penal offense for all those families who do not have a sufficient annual income to make it possible to carry out all these requirements. Such a law could only be made effective by adopting the facetious suggestion, which appeared in the "Medical Record" of January 19th over the signature of Seth Hill, Stepney, Conn., making it compulsory for all women unable to carry out all these requirements "to wear an antiseptic pad over the vulva from the inception of the catamenia until the menopause, to be non-removable without strict antiseptic precautions under the carbolic spray;" and to secure this pad, it would be necessary that some State official should apply the lock, which, no doubt, many present have seen in the Museum de l'Hôtel de Cluny, said to have been used by the noblemen of France to prevent their wives from falling during their absence in the Crusades.

The description given of the puerperal fever, true as it may be, in its outlines, of the septicæmia which gynæcological sugeons are so often forced to encounter, I think, will strike obstetricians familiar with the disease in the lying-in chamber as the ideal picture of a poet, differing as much from the scientific description of trained clinical observation as the pictures of natural scenery by a Byron or a George Sand would differ from a scientific description of a mountain or a lake by Humboldt.

As to diagnosis, I cannot regard the symptoms mentioned, even in their totality, as pathognomic of septicæmia, as all of them are to be found in other puerperal affections, when there is no evidence of septic absorption, unless with the author it be assumed that all puerperal disturbances are due to this cause alone. It is made an important point by the author to determine whether "the septic disease which is developing has originated in wounds situated between the os internum uteri and the vulva, or in the endometrium, above the

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former point." He says that "usually the question has to be decided by the efficacy or inefficacy of frequent germicide vaginal injections in bringing down the temperature and controlling other grave symptoms.

Now, I look at this subject from an entirely different point of view, and, as I have not the time to examine in detail the treatment inculcated in the paper we are now discussing, I must be content with the expression of my convictions by a few general propositions.

In puerperal fever as met with in my private practice, we have to treat the *consequences* of some form of blood-poisoning. This may or may not be septic poisoning. In private practice, I think it generally due to some occult, possibly atmospheric, epidemic influence; in hospital patients, nosocomial malaria, often associated with septic poisoning.

No treatment which interrupts the normal physiological processes—such as the retrograde metamorphosis of involution, the fatty transformation of the component fibres of the uterus, or the cicatrization of its internal surface by the exudation of organizable lymph, and the development of a new layer of mucuous membrane, or the healing of traumatic lesions—can be justified, unless positive symptoms, now well understood in science, demonstrate their necessity.

Antiseptic injections, both vaginal and intra-uterine, are of great service when the indications for their use are clearly shown by local signs or general symptoms, but they can not be recommended with safety as a routine practice on theoretical grounds, as, for obvious reasons, they may be most detrimental in retarding the cicatrization of lesions and the other processes of normal convalescence, and are otherwise sometimes dangerous. In several cases which I have seen with others, where antiseptic injections, both vaginal and intra-uterine, had been used with all the care and precautions inculcated by the author and kept up several days, the temperature rapidly fell, the profuse and sometimes offensive vaginal discharges speedily diminished, the pulse and general condition manifestly improved after the injections were discontinued.

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I will only add a few words in regard to refrigeration as a means of reducing fever in puerperal diseases. I have no question that it may be useful in some cases, but my own experience in this method of treatment has not been favorable. Many years ago I tried it in several cases in Bellevue Hospital, but I soon gave it up, as the results were less satisfactory than where other plans of treatment were pursued, and I know that this was the conviction of my house staff. Cold will effectively and usefully reduce the temperature in active inflammations and acute fevers, but in adynamic diseases and in hectic fever this must be attended with a rapid waste of tissue more dangerous than the pyrexia. In three cases which I have seen with others—two a year ago and one this winter—where the coil has been assiduously kept over the abdomen, most of the time two or three days, the condition in each were remarkably similar. The abdomen was blanched, colorless, and not sensitive to pressure; the patients all avowed that the coil gave them great comfort, but the temperature was very high in all—in one 104.3°, and in the other two over 105°; the pulse was very rapid and feeble, the heart's action extremely weak, with pulmonary symptoms—such as short, rapid, and shallow respiration—which caused grave apprehension that there might be latent centric pneumonia. After some discussion, I induced my friends to remove the refrigerating coil, and, in its place, to cover the abdomen with flannel saturated with the oil of turpentine, for the purpose of stimulating vaso-motor action, restoring the capillary and equalizing the general circulation. All were taking quinine in large doses. This was greatly diminished or wholly stopped, and digitalis and ammonia in full doses were substituted. In a few hours the change in each of these cases was most remarkable; the temperature was reduced from two or three degrees, the pulse was greatly lessened in frequency and increased in force, and all pulmonary symptoms, which had caused so much anxiety, had disappeared. Two of these patients recovered and are still living. The third, who had also been treated by antiseptic vaginal and uterine injection, was apparently convalescent,

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when suddenly she became much worse; collapse supervened, which was found to be due to a sudden development of diphtheritic membranes which covered the mucous surface of the vulva and vagina, the result of carelessness and dirtiness of the nurse. The patient died in a few hours.

I now ask permission to refer to a matter outside of the question of the prevention and treatment of puerperal fever, but in behalf of the "truth of history." I ask any who may feel sufficient interest to turn to the 320th page of my work on the "Puerperal Diseases," where they will find on this and the following pages the subject of intra-uterine injections fully discussed. Instruments for this use, which had been devised more than fifteen years ago, were shown to the class, and explicit directions were given, as to the methods and indications for these injections, differing in no essential from those we heard in this hall on the 6th of December. The lecture was delivered in the amphitheatre of Bellevue Hospital, in February, 1869, and the work in which it was printed was published in January, 1874. Then it may interest some to look at page 85 of Volume IV of the "Transactions of the American Gynæcological Society," and read the papers by Dr. Edward W. Jenks, of Chicago, and Dr. James R. Chadwick, of Boston, on intra-uterine injections, and the discussion which followed.

In conclusion, I will only add that my creed to-day is fully avowed on page 476 of the book to which I have before referred, and, unless in the future I learn new facts and new argument to change my faith, I shall "die impenitent."

After the reading of the paper, Dr. Barker said:

The subject is now open for general discussion. So many of the fellows of the Academy have signified their willingness to speak, and there are so many whom all will be anxious to hear, that I felt it to be a duty to limit my remarks in the paper just read to a very restricted time, and to content myself with the enunciation of such general principles as I believe to be important truths, without entering much into details.

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But there is one point which I hope will receive attention from the speakers who are to follow. Very early in my practice I began to direct the use of vaginal antiseptic injections for the first week after labor, the antiseptic being Labarraque's solution. When I went on duty at Bellevue Hospital, now nearly thirty years since, this was made the invariable rule in the lying-in wards. Subsequently carbolic acid was substituted, and I give a formula for its proportions in the work on "Puerperal Diseases." I have habitually directed its use in all my obstetric cases until the past two or three years.

At the time of the International Congress in London, in 1881, I happened to be seated at a dinner next Dr. Thomas Keith, of Edinburgh, and had a very interesting conversation with him as to the use of antiseptics in ovariotomy. What he said was very suggestive, and led to a good deal of subsequent reflection on my part as to the use of antiseptics in obstetrics. I recalled to mind the fact that often in my practice I had seen disturbances and interruptions of puerperal convalescence the first week after labor, and it occurred to me whether this might not be due to the carbolic acid; and the following autumn I decreased the proportion of the carbolic acid one half, and thought that my patients did better. On further reflection on the subject, I said to myself the carbolic acid, even in the larger proportions which I have formerly used, was not strong enough to destroy the micro-organisms. Is it not possible that Nature has wisely arranged to furnish the best fluid for constantly bathing the bruised and lacerated tissues of the parturient canal in the much-maligned lochia? Are not absolute rest and freedom from disturbance of the tissues much more favorable to their restoration than any washes that can be used? Since that time I have considerably surprised nurses by directing that no injections should ever be used unless specially ordered. It is scarcely necessary to say that absolute cleanliness was strongly enjoined, and that not a spot of blood, either on the bedding or on the clothing of the patient, should be found.

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Dr. A. A. Smith, who frequently visits my patients when I have other engagements, during the first puerperal week, tells me that this direction was given more than two years ago. Since September, 1882, it is only a small proportion of my obstetrical cases that I have seen any reason for ordering even vaginal injections, and Dr. Smith informs me that this is true of his own cases. We both can declare that since that, including even instrumental deliveries, we have not had a single case in our practice which during the puerperal period has given us any anxiety or required more than an ordinary attendance of one daily visit for nine days.

This may be only a happy coincidence, but it seems to me significant, and I think most present may like to hear the views of others on this new departure.

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A REPORT ON THE PROGRESS OF BIOLOGY IN EUROPE.*

By C. HEITZMANN, M. D.

When, in 1872 and 1873, I discovered and published new facts concerning the structure of the so-called protoplasm, the substance considered as endowed with life, and hitherto taken to be structureless, also concerning the structure of the whole animal body, I did not expect immediate acceptance on the part of microscopists. Observations of so delicate a nature as those under consideration, require a well-trained eye, excellent lenses, and an unprejudiced mind, properties not often met with even among professional biologists. Still, I trusted, that by training the eyes of unprejudiced observers, I would succeed in showing all the anatomical facts, on which the new assertions were based; and it was with this point of view, that I left Europe and established, entirely by my own means, a laboratory for microscopical research in New York City. Indeed, all my hopes were surpassed, and I had within the last nine years a very large number of attendants in my laboratory, approaching 800, who without difficulty could satisfy themselves as to the correctness of my assertions, after being trained to see everything under the microscope, that our present means of observation permit to see. A little over one year ago I published the work, in which all new facts, and conclusions drawn from the facts, were laid down for the profession at

*Read at the meeting of the Academy of Med. of New York, Dec., 20th, 1883.

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large. This work has met with some bitter criticisms of our professional brethren in America.

This year I have spent six months in Europe, my aim being, among others, to find out how far microscopists abroad have advanced in their views, and, on the other hand, to prepare the soil in Europe for the new doctrine, satisfactorily spreading in America. The results of my inquiries and observations are briefly as follows:

One of my assertions had been, that so-called protoplasma was not a structureless substance, but exhibited, at a certain stage of development, a distinctly marked reticular structure. The nucleus, if not solid, I maintained, has in its interior a network with marked points of intersection, the nucleoli. From the nucleus emanate a great many conical threads, inosculating with the neighboring so-called granules of the protoplasm, and all the granules are united by means of delicate threads, in fact being nothing else but the points of intersection of the reticulum. The lump of protoplasm, I claimed, is enclosed by a continuous thin layer of the same substance that forms the nucleus and the reticulum.

I have inquired of all microscopists of repute in Europe, as to their views with regard to the reticular structure of protoplasm, and none of them has hesitated to acknowledge the fact, that this structure really does exist. If here, in America, some writers claim their inability in seeing the reticulum, this will not interfere with its presence and its visibility, if both the eyes of the observer and his objectives be in good order.

My interpretation of the reticulum was that it is the living matter proper, and this living matter does not materially differ either in the nucleus or in the protoplasm. The ground taken by myself in this assertion was, that during life the reticulum is in continuous motion; that all changes of form and place of the lump are results of motion, viz., contraction and extension of the reticulum within the lump; that all endogenous new formation in the process of growth and inflammation starts from the reticulum, respectively, its points of intersection.

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This view is not universally agreed upon by the biologists abroad; for there I heard the opinion upheld that the substance filling the meshes of the reticulum, which I consider as destitute of life, also may, to some extent, exhibit properties of life. When I asked for the reason of such an opinion, I found it based mainly on the fact, that during the contractions of the original lump small portions of its body may be cast off, or be separated from the mother body, still exhibiting signs of life. This fact, however, becomes easily explicable, if we assume a thin covering layer of living matter to every separated particle, and realize that the reticular shape at any moment may be transformed into the sheet, or flat layer, necessary to enclose and cover isolated lumps. The expression "paraplasma" for the designation of the substance filling the meshes, I would consider as superfluous.

A number of biologists, Srassburger, Büntschli, Hertwig, Fleming and others have drawn attention to the reticular, star or loop-shaped arrangement of the threads within the nuclei of both animal and vegetable elements, and Fleming, more particularly, was painstaking in drawing all sorts of figures and groups of division, for which he proposed the term of "indirect-partition" or "Karyokinesis." We have no proof as yet, that the figures in the nuclei, tending toward a division into halves, really terminate in such a division; moreover the most marked figures of "Karyokinesis" are not found at the time of the liveliest new formation of epithelia. The presence of such figures, in my judgment, would simply indicate that in the nucleus there is a substance capable of changing its shape almost continually, a capacity only due to the living matter proper. Theo. Eimer, of Tübingen, drew the attention of the scientific world to the fact, that I had described this matter as the life portion of the nucleus. The fact that certain staining re-agents bring to view the figures only within the nuclei and not in the adjacent protoplasm, could be explained by considering the delicacy of the reticulum in the protoplasm in comparison with its bulk in the nucleus, and its being affected by the

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re-agent much easier in the latter portion, than in the former. There is no reason for assuming that the substance constituting the reticulum in the nucleus, is materially different from that of the protoplasm, as some observers have suggested.

The presence of a contractile and extensible reticulum within the epithelia, without difficulty explains the formation of a mucous secretion on that end of the epithelium nearest to the calibre, owing to a contraction of the reticulum on the opposite end, the so-called foot, which latter portion, as a rule, also holds the nucleus. There is no necessity for assuming, as Prof. Spina does, that the electric current produces an active expansion of the reticulum at the peripheral portion.

My second assertion, in 1873, has been that in all varieties of connective tissue, viz., the myxomatous, fibrous, cartilaginous and bony, the substance formed around the so-called cells, known by the terms intercellular or basis-substance, hitherto considered lifeless, has a reticular structure of living matter, the same as the protoplasmic bodies, constituting the so-called cells. There is no essential difference between "cells" and "inter-cellular substance." I maintained, both have a reticulum of living matter, continuous, throughout all varieties of connective tissue, and nowhere interrupted throughout all tissues of the animal body. The only difference between the elements of the tissue and the basis-substance, separating these elements from each other, is, that in the former the meshes of the reticulum are filled with a liquid, in the latter with a comparatively solid substance, the glue-yielding substance in the widest sense, whose refraction besides completely or nearly so, conceals the living matter contained therein, in fresh specimens and those preserved by our usual methods. By staining the connective tissue with a solution of nitrate of silver, I brought to view the reticulum light on a dark brown ground, while solution of chloride of gold rendered the reticulum dark violet both in the protoplasmic bodies and in the basis-substance. I concluded, from these observations, that the cellular theory was a mistake altogether; for in

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the tissues there are no isolated, individual "cells" at all, only different zones, which, in a great measure, correspond to the territories of Virchow. What Virchow considered as a species of "cells," the so-called "branching and uniting cells," holds good for all "cells" or elements in general, the connection being far more intimate and close, owing to the presence of the reticulum in the basis-substance, than the named observer had ever suggested.

This new view concerning the structure of the animal body gains ground in Europe, though very slowly. Thus far only A. Spina, Professor in Prague, Austria, has fully acknowledged it, likewise necessitating the abandonment of the former cell-theory. He three years ago found an easy method by treatment of fresh cartilage with strong alcohol, to render plainly visible the connections of the cartilage-corpuscles by means of innumerable offshoots that pervade the basis-substance. Quite recently he examined the mesentery of a freshly killed animal with fresh blood-serum, thus excluding all improper interference on the part of re-agents, and sees the reticular structure both in the connective tissue corpuscles and in the basis-substance between them in a slow, but distinct motion and change of form. S. Stricker in Vienna has, in the last few years, come to the conviction that the basis-substance is endowed with properties of life the same as the elements themselves. His object of research was mainly the cornea of frogs in the early stages of the inflammatory process. Specimens, which he kindly demonstrated to me, leave no doubt as to the correctness of the view that the basis-substance holds a great deal of living matter, and is living, therefore, all throughout. S. Stricker publicly announced that it took him six years of labor and research, before he became convinced of the correctness of my assertion that the basis-substance is alive in the living body. He, however, disagrees with me in a slight point, inasmuch, as he considers the basis-substance alive in toto, while I attribute the properties of life only to the reticulum, imbedded in the lifeless basis-substance proper. By this discrepancy the essential points, to be sure, are not altered, but S. Stricker

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in the recently issued last part of his Pathology confesses, that he now has lost the understanding of the basis-substance; he does not know what it is for. With me, there is not the slightest difficulty in understanding the significance of the glue-yielding portion of the connective tissue. Stricker still speaks of "cells" in the previous sense of the word, though he personally admitted to me that such a thing does not exist. He uses the word, he said, simply to make himself understood by his professional brethren.

In Germany there is little ground gained as yet for the new views; for the vast majority of microscopists adhere to the old-fashioned cell-doctrine, and it seems to be impossible to them to abandon the individuality of so-called cells.

My third point, in 1883, was an entirely new view on the process of inflammation, as the result of the discoveries concerning the normal structure of connective tissue. I maintained that not only the so-called "cells" do grow and proliferate in inflammation, but also the basis substance furnishes a considerable amount of inflammatory elements. First, I said, the basis-substance proper becomes liquefied; next those elements re-appear which once shared in the formation of the basis-substance within the territories; at last new formation of elements takes place through new formation of living matter, starting from the points of intersection of the embryonal elements. So long, I asserted, as the newly appeared and newly formed elements remain interconnected by means of delicate filaments, the inflamed tissue remains a tissue, and it will produce a new tissue, leading to what has been termed Hypertrophy or Hyperplasia. If, on the contrary, the inflammatory corpuscles are torn asunder and become isolated, they represent what we know by the term "pus-corpuscles" and from the moment suppuration has ensued, the tissue ceases to be a tissue, it is destroyed. S. Stricker, who for a number of years used to call "pus-corpuscles" all the inflammatory elements that become visible in the inflamed tissue, now admits that so long as the connection of these elements be uninterrupted, they are not entitled to the term of pus-corpuscles. S. Stricker recently

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denies the existence of migrating corpuscles within the basis-substance of the inflamed frog's cornea, since he observed that the apparent locomotion of such corpuscles is not due to the pushing out and retraction of offshoots, but simply to an appaling of the portions at the distal, and the appearance of new protoplasm at the proximal end of the corpuscle. He now claims that the phenomenon of creeping is the result of a partial transformation of the basis-substance into protoplasm, which latter very soon reassumes the properties of basis-substance on one end. He compares this phenomenon with the melting of a wax-layer by a lamp held underneath, the lamp being drawn slowly in one direction under the sheet of wax. If this interpretation of Stricker's be fully correct, the last reason for assuming the migration of elements to be an essential part of the inflammatory process would fall to the ground.

In Germany, however, a large number of pathologists seem to still adhere to the emigration of colorless blood-corpuscles, as the main feature in inflammation, though the founder of this theory, Cohnheim, himself, slightly begins to yield. This observer now admits that the connective tissue corpuscles of the inflamed tissues themselves share in the new formation of elements, in the process of reparative increase of elements. In this view, he found a ready follower in Ziegler of Tübingen. Both these gentlemen publicly accuse Stricker of having maintained facts concerning the inflammatory process, which outside the Vienna laboratory nobody could see. This simply shows how far they are yet from a correct interpretation of the occurrences in inflamed tissues, plainly demonstrable under the microscope. In 1872, I supported Stricker by maintaining that the elements of the inflamed connective tissue and their coarser off-shoots, by division partake in the inflammatory new formation, whereas, one year later, I went so far as to claim that the basis-substance, too, furnishes a large number of inflammatory corpuscles, owing to the presence of living matter in it. In the last few years, Stricker has fully acknowledged the correctness of the latter assertion.

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Von Recklinghausen of Strassburg, who is considered the best pathologist in Germany, in his recently issued book on pathology, though cautiously, admits that the new formation starts from the elements or cells of the connective tissue and the walls of the blood-vessels. But he is far from receiving the new view that the greatest part of this new formation is a result of the rejuvenescence of the basis-substance. Apparently, it will take many years' labor, before this fact is acknowledged in Germany.

With regard to the structure of epithelia, I was the first, in 1873, to maintain that they are reticular just as all other protoplasmic bodies are. I also drew attention to the fact that the cement-substance, separating all epithelial and endothelial formation from one another, is invariably traversed by delicate, conical offshoots, the so-called "thorns" of Max Schultze, which are formations of living matter, serving for the interconnection of the epithelial elements. S. Stricker, of Vienna, recently has proved, that the cement-substance in living epithelial layers may be entirely absent at times, and at times make its appearance. The continuous layer of protoplasm thus is divided into single elements under certain circumstances only. L. Ranvier, of Paris, surprised me with specimens which go to prove the connections of the epithelia by means of delicate conical threads in a manner much more plain than it was possible to demonstrate before. Upon my query, if he would not be prepared now to accept the new doctrine, that all the elements are interconnected within the animal body, he answered in the affirmative, so far as epithelia are concerned. I cannot enter into this question more closely, as Ranvier did not publish yet his methods for bringing forth the filamentous connections of the epithelial elements.

E. Klein in London, likewise, is thoroughly convinced of the reticular structure of epithelia, and although he is quoted by many English and American writers as the discoverer of this structure, he in personal conversation unhesitatingly admitted my priority in this matter. How far the English microscopists are advanced to receive the new doctrine, I was

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unable to ascertain, although they listened to my explanations with great interest. I trust, the time is not far distant when these independent and sharp observers will become convinced of the correctness of the new views.

In the question of tuberculosis, I, in 1873, took the ground that it is a thoroughly constitutional disease; and later I proved that all phenomena of this disease could be explained by a decreased amount of living matter throughout the whole body. My definition of the tubercle has been: an avascular inflammatory product, the lack of newly formed blood-vessels being due to a lack of living matter. I objected to the idea that tuberculosis is an infectious disease, and claimed that the capacity of producing tubercles lay in the animal organism, used for experiments (guinea-pigs, rabbits, rats and dogs exceptionally) rather than in the material used for inoculation by the experimenter himself. Recently, as is well-known, R. Koch claimed to have discovered a bacillus characteristic of all tubercles and having the virtue of producing tuberculosis, whenever inoculated into the animal organism. A. Spina and S. Stricker, of Vienna, strictly denied the correctness of Koch's assertion, based upon experiments and microscopical research. What I have seen in Vienna corroborated the ground taken by myself and the two last named observers. W. Gärtner, in Stricker's laboratory collected the mucus of his own nose, being the seat of a catarrhal inflammation, and after several days' putrefaction this mucus swarmed with Koch's bacilli, although the gentleman is otherwise perfectly healthy, at least, far from being tuberculous. Spina injected lycopodium-seed previously treated with a solution of bichloride of mercury, for the destruction of eventual germs, into the abdominal cavity of guinea-pigs, and ten to twelve days afterward killing the animals, found tubercles in the liver, the kidneys, the intestine. Each tubercle contained in its middle, as he kindly demonstrated to me, several lycopodium seeds. These are, I should say, strong proofs against the theory of Koch, besides the facts that the characteristic bacilli were found in the sputa of such persons also who did not suffer from tuberculosis.

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Nevertheless, the vast majority of German pathologists seem to adhere to the theory of Koch, though they admit that a certain predisposition is required on the part of the organism to make it catch the bacillus, and become tuberculous by it. This predisposition is the very explanation of former pathologists for tuberculosis; it ought to explain very much, and in reality does not explain anything. In the midst of all the controversy on tubercle-bacillus and all sorts of other bacilli, responsible for a great many diseases, recently also for croupous pneumonia, we must patiently await the extinction of the epidemic in the minds of the pathologists.

My excursion to Europe led me to the conviction that, with the exception of Vienna, they are making very slow headway in biology. Without boasting I can say that we in America are, in the main questions farther advanced than the biologists abroad. The support given to my own doctrine by the best microscopist in Europe, S. Stricker, is highly encouraging, and, perhaps, will convince some skeptics that my assertions were more than outbreaks of a lively fantasy.

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ANTISEPTIC DRESSINGS AS THEY ARE USED AT THE NEW YORK HOSPITAL.*

By ROBERT F. WEIR, M. D.,

SURGEON TO THE HOSPITAL.

ALTHOUGH but comparatively little of novelty to hospital surgeons can be presented this evening, yet it has been thought that a demonstration of the antiseptics now in use in a large hospital would be not uninteresting to the profession at large. It is in this belief, therefore, that I venture to appear before you. Nevertheless, while there may appear differences in details between the dressings now used and those formerly resorted to, yet it must be firmly kept in mind that the principles embodied in the dressings remain the same as when first set forth by their promulgator, the too imperfectly honored Sir Joseph Lister, whose successful labors in saving life appears to us on this side of the Atlantic worthy of higher recognition than the baronetcy which has just been bestowed upon him.

What we still aim at in the treatment of wounds is to place the divided or injured parts in such a condition as to permit of the best possible drainage, and to keep them at rest as long as may be without frequent renewals of the dressing; and, for the accomplishment of the latter end, we are forced to use such chemical substances as will prevent decomposition. Notwithstanding the desire to avoid the theoretical portion of this subject, one cannot escape

* Read before the New York Academy of Medicine, January 17, 1884.

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the conviction that the development of micro-organisms is associated with putrefaction as a cause or immediate concomitant effect. Although much light remains to be shed on sundry points—such as whether one variety can develop into another, whether the poisonous action of germs differs with their growth, and what soils are most favorable to their increase, etc.—yet the prime fact above mentioned is now unquestioned. Somewhat recent investigation, it is true, have shown us that micro-organisms are to be found at all times in the air-passages and the intestines, but the researches of Lister have also taught us that the living tissues have considerable power to resist the development of such germs. This fact explains away the objection so often raised that every scratch should give rise to septicæmia. When, however, the tissues became unhealthy or abnormal, a better soil, so to speak, is furnished for the growth of the micro-organisms. What constitutes the change in the internal organs, however, is yet an unknown quantity. Externally, we can appreciate it easier. A contusion, a laceration, or the damage done at an operation brings about such alterations in the tissues as to impair their antagonizing power, and also to furnish a fruitful soil for development.

It is the aim of antiseptic surgery to neutralize such favorable conditions for germ development. This has been best done until recently by means of carbolic acid and iodoform.

The details regarding these substances I will not again go over, but would simply say that neither the carbolized gauze of Lister nor the improved gauze of von Bruns, in which castor-oil is used as a substitute for paraffin, is free from the objection that the carbolic acid which it contains has such strong volatile properties that the material, if not used when fresh, is an uncertain staff for the surgeon to lean upon. It will also be remembered that one of the great objections brought against the use of both carbolic acid and iodoform, a still more recent antiseptic, was that they were liable to produce toxic effects, and our surgical literature is studded,

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and not very sparsely either, with cases in which fatal or alarming complications have occurred from this source. It was for this reason that I welcomed an antiseptic which was more potent, safer, not volatile, and easily obtained everywhere; I refer now to corrosive sublimate. Since I first became acquainted with the excellent antiseptic qualities of this salt, a year ago last March, I have been using it constantly; and it is this personal experience, corroborated by witnessing its effects in the hands of other surgeons while I was abroad this Spring, which leads me to present it again to you to-day, and to recommend its virtues. In the north of Germany, corrosive sublimate has come to displace iodoform and carbolic acid almost entirely; iodoform, however, is used to some extent in southern Germany, particularly in Vienna; but the healing of wounds I found was more satisfactorily produced in the hospitals of Kiel and Hamburg under the sublimate dressings than anywhere else that it was my good fortune to visit.

Corrosive sublimate is kept in contact with wounds in four or five different ways. Gauze, cheese-cloth, or mull, for instance, is impregnated with this antiseptic, and applied in several layers over the line of union of a wound just as the carbolic or iodoform gauze is employed. We endeavor to increase the absorbing power of this gauze by getting rid of the oily matter in it by boiling it in a weak solution of either soda or muriatic acid, then washing it again in water and drying it. Lately we have succeeded in obtaining it already prepared from the manufacturers.*

But, in order to make an equable pressure upon the tissues as well as to avoid a too frequent change of the dressing, which is apt to occur with gauze alone, materials of greater absorbing power and softness have been resorted to. In this connection peat immediately comes into one's mind. This substance, which I now show, was first employed, mixed with iodoform, at Kiel, and it is there to-day preferred as an absorbent material, the only change in the manner of

* Chuck & Bros., 71 and 73 Greene Street, New York, who furnish it at four cents a yard.

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employment being that with the white peat the German surgeons at present mix some of the black sort, which is more carbonaceous, and, like charcoal, is somewhat antiseptic; one part by weight of the black peat is mixed with four of the lighter colored. I do not think that its advantages over the white are great, although Neuber places some importance upon it. One of the great advantages of the peat dressing, as pointed out by the latter surgeon, is the fact that it permits of a long period of perfect rest without disturbance by a change of the dressing. I saw patients in his wards who had worn the peat dressing without change for forty-two days. I have myself not felt disposed to leave a dressing on for so long a time as this, for I think that the tendency to septic absorption has usually passed away by the tenth to the fifteenth day, and that there is nothing to be gained by leaving the dressing on for a longer period. Another greater objection to the peat and other absorbent dressings is that they are so bulky as to prevent the easy use of splints, and, hence, in the case of compound fractures, etc., I feel a desire to inspect the parts, to determine the position of the bones, etc., more frequently than once in two, three, or four weeks. In many other cases the long continued dressing is of great value.

Some time ago we were in the habit of using in these wards a substance obtained from an Indian tree known as jute, employing it carbolized. But it was found that the carbolic acid rapidly disappeared, even more so than from the Lister gauze,* and the dressing therefore fell into disuse, to be revived again, however, when corrosive sublimate came into notice. While abroad I saw a preparation of jute which it would seem would meet any one's ideal. Here is a specimen of the old and of the new kind which I would call your attention to; you will observe that the first specimen, although the best to be obtained in the market here, contains many coarse fibres, and is quite harsh and ropy; the other is free from these faults, and is very soft and silky, and ex-

* See the "New York Medical Journal" for January, 1880.

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tremely comfortable to the patient. We have still another substance which perhaps absorbs better than any of these; for this also we are indebted to the Germans. I do not know that it is made in this country. This was imported from Tübingen.* It consists of the pulp of wood manufactured into a cottony form for ready conversion into paper. It is capable of absorbing thirteen and a half times its weight of water, while jute has the power of absorbing only four to six, and peat nine or ten times its weight of water.† While, therefore, wood-wool has greater absorbent properties than any of the other substances mentioned, it has an advantage over peat in being more cleanly. It is also easy to obtain, and costs here eight cents a pound. It is also mixed with the peat. Neither it nor peat, however, is so soft and easy to a wound as jute.

Lastly, there is a substance which may be used for this purpose, but which I have just tried—a substance which those practicing in the country certainly can always obtain—namely, the ordinary moss of the woods. It requires to be dried in an oven to kill the insects found in it. It is soft, and has strong absorbent powers; it will take up about four times its weight of water. I am disposed, from its softness and elasticity, to think that this substance would be found to be next to jute as a dressing, and after it wood-wool and peat.

All these substances are prepared for use in a very simple way. The jute and moss are dipped into a solution of corrosive sublimate, 1 part to 1,000 of water, and 50 parts of glycerin. They are steeped all night in this, then wrung out, and allowed to dry in as far as the presence of the glycerin will permit.

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* Peat, wood-wool, and decalcified drainage tubes are imported by M. Lienau, 2 Jones Lane, New York. The sublimate gauze, cotton, and catgut are excellently made by am Ende, of Hoboken, N. J. Peat costs six cents a pound, wood-wool eight cents, and fine jute forty cents.

† Walcher. "Mittheilungen aus der chirurg. Klinik zu Tübingen," 1883. Neuber, however, says that peat absorbs sixteen times its weight of water, and wood-wool only eight times its weight. ("Mittheilungen aus der chirurg. Klinik zu Kiel," 1883).

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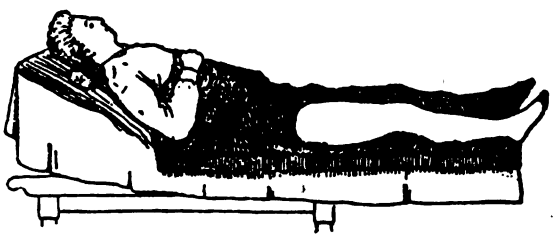
The gauze and cotton batting, deprived of oily matters, are immersed in a little different solution, viz.: Corrosive sublimate, 20 parts; water, 4,480 parts; glycerin, 500 parts, which is a one-quarter-per-cent. solution. A slight aniline tinge is given to the gauze to distinguish it from, the unimpregnated material. These are the solutions now used in Sched and Kümmel's wards at Hamburg, being somewhat different from those I published last winter. I will only add, it is desirable to have these preparations somewhat freshly made, as often slight deterioration occurs from the change of the bichloride into calomel.*

At the time of the operation a solution of corrosive sublimate—1 part to 1,000 of water (sometimes 1 to 2,000)—is allowed to trickle slowly, but nearly continuously, over the incision.† It is made to run so freely at some of the clinics in Germany that the surgeon and the assistants wear not only a rubber operating coat, but also rubber shoes, in order that they shall not be swamped with the fluid. In order to protect the patient from this deluge, an ingenious device of rubber cloth is resorted to, which you see here. The limb is passed through a hole in a large rubber sheet, which is tightened by a purse-string of rubber tubing, and the upper half of this sheet is then thrown back on the patient's body, as is shown in this drawing, which I have taken from Neuber's work, "Antiseptischen Wundebehandlung," 1883.



* This is the easiest tested by dropping some lime-water on the dressing. If a yellow spot is seen, bichloride is yet present; if a black spot appears, calomel has formed.

† In operations involving the thoracic and abdominal cavities the carbolic spray continues to be employed.

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The bleeding vessels are tied, not with catgut made according to the Listerian method, but by being put in a bichloride solution—1 part to 100 of water—for ten minutes, and then in a watery solution of 1 to 1,000 for ten to fifteen hours, and afterward wound on bobbins and kept in absolute alcohol. This makes a much better ligature than when the catgut is prepared according to the formula given last year, and which was formerly used in Germany. According to that method, the catgut was kept in a solution of sublimate in alcohol and glycerin, which made it unsatisfactory. We also sometimes make use of the ligature prepared according to the method of Kocher, of Bern—namely, first putting the catgut into the oil of juniper twenty-four hours, and afterward into absolute alcohol. Both of these kinds of catgut are great improvements on the oily catgut of Lister, not slipping, and being much easier to handle, as well as more satisfactorily antiseptic. The chromic-and-sulphurous-acid dry catgut of Lister has been found to be too hard and insoluble, and has therefore been discarded. The possibility of absorption of the corrosive sublimate solution causing toxical effects has been kept in mind, and has led some to the use of a milder antiseptic, such as that suggested by Thiersch, of Leipsic, which, consisting of boric acid, 6 parts, salicylic acid, 1 part, and water, 500 parts, is called the borosalicylic solution. This is allowed to flow over the wound in the course of the operation, the final washing being made with the corrosive-sublimate solution. Schede, however, informed me that he had employed the corrosive sublimate solution in over a thousand cases, and had found toxical effects in only three or four instances, and then only as a stomatitis or a diarrhœa, not requiring the dressing to be abandoned. I myself have not seen, so far, any poisonous effect from the use of the sublimate solution. It sometimes causes a slight erythema around the edges of the wound, but no more so than do carbolic acid and iodoform, and not so much as does subnitrate of bismuth, which is an antiseptic that has recently been introduced to us by Kocher, of Bern, but which, unfortunately, has no control over erysipelas.

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All hemorrhage having been checked and the parts cleansed, you proceed to sew up the wound, using catgut, not silk, for this purpose. If silk be used, it must have been previously impregnated with the corrosive sublimate. Instead of the ordinary interrupted suture, the continued suture is what is now employed, and, if it is necessary to recross the stitch, no disadvantage results from that fact. There must be sufficient space left to admit of an ordinary rubber drainage-tube, or that introduced by Neuber, made of decalcified tubes cut out of bone. You can make them, however, of chicken-bones, for instance, by placing such in dilute muriatic acid until only the soft part remains. In cases of amputation, or wounds where it is important to get primary union, it is desirable to use these decalcified tubes, as, in the course of four or five days, the major portion of them will have been absorbed or dissolved, making it unnecessary to remove the dressing in order to get rid of the tube, which we are obliged to do when the rubber drainage-tube is employed. One objection to the bone tube is that it often becomes absorbed too quickly:* to obviate which Küster, of Berlin, keeps it in absolute alcohol before use. All these preparations you will see on the trays passing around. Having cleansed the wound carefully by squirting the sublimate solution through the drainage-tube, you place over it several sponges to firmly compress it, and then take a piece of sublimate gauze, called a handkerchief technically, clap it over the center of the wound, and with it, in lieu of the sponges, make considerable pressure, and over that place half a dozen more pieces, in each instance renewing the pressure over the face of the wound. Then, over the central portion, you may apply either more of these handkerchiefs, or a compress of several thicknesses of sublimated gauze. The gauze should not be in too damp a condition, in order that, when the bandage is applied and firm pressure made, it may retain a degree of elasticity and better secure

* Another is that, when kept in carbolized oil for some time, they become too soft. They can be hardened by placing them in alcohol and glycerin, equal parts, adding to the mixture half a grain of sublimate to the ounce.

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rest. In Hamburg they resort to a refinement which I do not use, because it is believed to be unnecessary—that is, they place along the line of the sutures a layer of spun glass immersed in the sublimate solution, in order to prevent possible over-action of the antiseptic, and also, because of the capillary action of the fine glass, to cause ready absorption of the blood which may ooze forth during the first twenty-four hours. This refinement has also been abandoned in other portions of Germany. Kümmel, who employs the glass-wool in the manner just alluded to, is also accustomed to using twisted or braided glass to take the place of the drainage-tube. I do not think it possesses any advantage.

To return to the dressing: After securing your handkerchiefs over your wound by a few firm turns of sublimated gauze bandage, you apply your absorbent dressing, consisting of peat, wood-wool, or whatever it may be, done up in bags of suitable size and shape. These bags are from one to two inches thick, and tacked together in a number of places to preserve an even thickness. You may apply three or four smaller ones, adapting them about the wound, and then a larger one over these, and bind all firmly with a crinoline bandage dipped in the antiseptic solution, tucking sublimated cotton under the free edge, where needed. I pass a sample of these different dressings to you that you may appreciate their relative weight and softness. I think you will be struck at once with the fact of the superiority of the jute dressing. We do not use any impermeable substance on the outside of these dressings, as is done by Lister, as a precaution against the volatility of his carbolic acid. That is not necessary in the moré permanent dressing; moreover, the pads are very thick, and the discharges do not readily reach the outer surface. There is, moreover, an objection to the impermeable outer covering, in that it not only preserves the moisture of the dressing, with which it is employed, but it also retains the perspiration which takes place in the limb, and thus acts too much as a poultice.

If you find that on the second or third day there is no ele-

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vation of temperature, you may consider that your patient is doing well. If you find a slight staining from the discharge coming through the dressing, just douche the parts with the bichloride solution, and apply over the place an additional mass of sublimate cotton or gauze, and let matters go a day or two. In other words, we do not change the dressing until we find some decided signs that things are going wrongly. In fact, Esmarch told me that he did not consider a mere elevation of temperature of itself to indicate the need of change in the dressing. I should not be inclined to accept that view, but should consider an elevation of temperature persisting for twenty-four hours a sufficient reason for removing the dressing and searching for the cause.

On account of the action of the bichloride solution upon metals, we are still in the habit of immersing our instruments in a five per cent. solution of carbolic acid.

These remarks would not be complete without some words with regard to attention to cleanliness on the part of the operator and the assistants. You know that a good deal of importance has been and is placed upon cleanliness; it is even considered by some as the principal feature or secret of the antiseptic treatment. It is true that cleanliness will accomplish a great deal. One must candidly admit this, especially after reading about or witnessing the results of the treatment of Mr. Lawson Tait, of Birmingham, who may fairly be called the apostle of cleanliness. Not only does his published account of a hundred ovariotomies, performed with but few antiseptic precautions and in which there were only three deaths, entitle him to this distinction, but also does his recent oral statement that this year nearly 250 abdominal operations of various kinds had been accomplished with much the same diminished mortality. When I visited his wards there were seen seven cases of ovariotomy, three hysterectomies, one of opening into the gall-bladder, and two of exploratory incision, the patients in each of the cases doing well so far as progress toward recovery was concerned, though stitch-abscesses were not infrequently met with, and

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the incisions themselves were not so neatly healed as those seen in Czerny's wards at Heidelberg, and there were more temperature oscillations of moderate range than were seen elsewhere under antiseptic dressing. His hospital was the cleanest private hospital that I ever was in. He has only one assistant beside the etherizer. His instruments were few and simple, and kept in trays under water. He said he kept them submerged because they were easier to handle, and blood adhered to them less tenaciously. I would say here, in passing, that in Germany I was told that they flooded the floors of the operating-rooms to prevent dust and germs from flying about. I noticed, too, that Mr. Tait took his dozen sponges home with him, and I asked him the next day at his house what he did with them. He replied that either he or his wife personally cleaned them. The sponges were first put for twenty-four hours in running water, afterward, for another twenty-four hours, in a solution consisting of one pound of carbonate of soda to four gallons of water; then cleansed in water, dipped in a five-per-cent. solution of carbolic acid, dried, put in rubber bags and hung up in the laundry. Though the results attained by rapidity of operation, experience, and great cleanliness may, in the hands of a Tait, justify the diminution of antiseptic precautions in abdominal operations, yet that surgeon himself admits that the experience of men great in other departments of surgery has shown the advantages of antiseptics. To the ordinary surgeon, I believe that asepsis can be easier carried out than continued cleanliness, and will in the end give better results, as it is the essential something added to cleanliness.

I have, however, purposely dwelt upon the care of the sponges, because these are very commonly neglected even by those using antiseptics. It is, unfortunately, thought that carbolic-acid and sublimate solutions can be relied on to kill off every germ that may come in contact with them; unwise risks are therefore taken in many ways, and often sponges, hastily washed out in water and half filled with fibrin of the blood, are replaced in the jars containing the dis-

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infecting solution; and the surgeons themselves, disdaining a clean muslin or linen operating-gown as too butcher-like, insist on retaining what ostensibly are their ordinary coats, but in reality are those worn at many operations, as the splashes of dried blood and pus on them clearly show. In addition, the caution must also be given that, although increased security is furnished to the surgeon by the expert use of antiseptics, yet it is unwarrantable to expect success in every case, or to take injudicious risks on the strength of their employment. Mishaps will continue to occur, often from the surgeon's own fault, and at times in spite of all his care.

In Kiel, Hamburg, and Halle, whence our best surgical statistics are obtained, beside the cleanliness of the operating-room, gowns, and sponges, special care is taken to inculcate this valuable lesson by the public and thorough washing of the hands and nails of the surgeon and his assistants, and also by the scrubbing the skin of the patient with soapsuds (at Kiel an iodoform solution is then painted on), at the site of the intended operation. In the New York Hospital, prior to an operation, not only are the parts washed with soap and water, but also with a mixture of turpentine and alcohol, two ounces to the pint, both as a solvent for greasy matter and likewise as a penetrating antiseptic—turpentine being a germicide even in so weak a solution as one part to seventy-five thousand.

The sponges in our hospital, as in Germany, after proper cleansing, are kept in an antiseptic solution for a week before they are again used. To carry out this plan we have, as can be observed, on a shelf in the amphitheatre, a row of glass jars, seven in number, representing the days of the week. The sponges are, in the first place, prepared in the following manner: After getting rid of the sand by shaking and beating them, they are thoroughly washed in warm—not hot—water, for if hot water is used it deteriorates the quality of the sponge substance and tends to fix the dirt within its meshes. This is particularly so if the sponges have already been used at an operation. The sponge is

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then placed in a 1-to-1,000 solution of permanganate of potash for twenty-four hours. If the permanganate is found to be losing its beautiful pink color, a little more may be added. At the end of this time the permanganate of potash is washed out with warm water. The sponges are now bleached by immersion in a solution composed of one part of sulphite of sodium to one hundred parts of water, to which has been added a one-fifth part of a watery solution of hydrochloric or oxalic acid of a strength of 8 parts to 100. They are stirred up with a stick for a few minutes, until they whiten; if left longer they will become friable. Then they are washed out with water again, and left for some time in running water. The sponges are afterward put into a carbolic-acid solution, 1-to-20, or in a solution of 1-to-1,000 of the bichloride of mercury, and kept there until used. Sponges so prepared, such as we use at this hospital, cost but about one cent and a half each; and at that price they may be thrown away after use at an operation. This is my custom in private practice; at the hospital it is the rule that, if the operation is one upon the rectum, the vagina, or other parts where contamination is likely to take place, the sponges used are afterward destroyed; in amputations and other cleanly operations upon the otherwise healthy subject, the sponges are cleansed for subsequent use. In all abdominal operations new sponges are employed. The sponges that are to be again used are washed thoroughly in running water, and afterward kept for some hours in a weak carbonate-of-soda solution, to dissolve out the fibrin, etc., and then placed in the antiseptic solution as before. Such are the antiseptic dressings used at this hospital in the wounds to which they are applicable; there are certain wounds of the body, as of the mouth, rectum, and elsewhere, in which it is necessary to employ iodoform, which is better adapted to such localities. If you have no other preparation at hand, you can rub the iodoform into the ordinary gauze or simple mosquito-netting, and apply it to the wound. The sticky iodoform gauze is readily made by rubbing iodoform into the ordinary Lister gauze. Iodo-

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form also makes the best application for small lacerated wounds. But remember that more than forty-five grains will give rise to symptoms of poisoning.

Finally, the principle of rest should be carried out thoroughly. No matter how small the operation—as, for instance, the removal of a small tumor from the ankle—the limb is placed in one of the easily cleaned enameled-iron guttered splints of Volkmann's pattern, and held immovable until healing is accomplished or the risk of inflammation has passed away.

Such are the details of the management of wounds and injuries which at the present time seem best to fulfill the conditions demanded by an antiseptic treatment. It is hardly to be expected that the general practitioner will have at his command all the materials here shown. He can, however, have sundry powders of corrosive sublimate, of eight grains each, in his possession, and, when called to a case of injury, can rapidly add a pint of warm water to one of these powders, bathe the wound freely with the solution, dip into it some cheese-cloth, or, what is even better, ordinary absorbent cotton,* then squeeze this out as dry as possible, or, if time allows, partially dry it by exposure to heat and apply it to the wound. Drainage can always be accomplished with rubber tubing perforated in the ordinary manner, choosing, when possible, the black or red rubber for the purpose. This dressing, duly secured with a bandage dipped in the same solution, will answer for a first application, and permit you to prepare a more elaborate antiseptic appliance if you wish.

Now, does all this carefulness of detail "pay," to use the phrase of the day? The gynæcologist who, in 1877, told me I would surely kill my patient if I did a contemplated ovariotomy under antiseptics, not only was wrong, for I succeeded, but he himself has recently advocated, with all the force of his great name, the use of antiseptics to the

* This, according to Neuber, takes up fifteen times its weight of water.

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fullest degree in the lying-in chamber; and the most distinguished surgeon of our city, who opposed Listerism when first presented here,* is now one of its most strenuous advocates.

To further express the value of an antiseptic treatment, I shall only allude to a very few facts bearing on this point. It is like discussing a self-evident proposition, but, as there are always some doubters, I beg to take some figures from our midst. Prior to the use of antiseptics the mortality from compound fractures of the arm, forearm, thigh, and leg was over thirty-three per cent. in the Roosevelt and St. Luke's Hospitals; in the old New York Hospital it amounted to sixty per cent.; in the Boston City Hospital, to forty-one per cent. This was under the old treatment of poultices, salves, fracture-boxes, etc. Under the open treatment, with such counter-openings as were necessary, the mortality, in the best hands, dropped to twenty-six per cent. Under antiseptic treatment, I have had 118 major compound fractures, with 8 deaths, a mortality of six per cent. Up to my seventieth case I had not a single death, but, in endeavoring to treat by this method some of the severer forms of compound fractures from railroad accidents, I lost several patients, and spoiled my record. Lately, I have had twelve cases of compound fractures treated with the sublimate dressings, without a single death.

Similar testimony is to be had in connection with amputations. Billroth's statistics are here extremely valuable, giving the experience of a skilled surgeon with various methods of treatment—where, in other words, the personal equation remains the same. This surgeon, from 1860 to 1867, with the open method of treating wounds, had a mortality in amputations of 35.1 per cent. From 1868 to 1875, he continued to use the open treatment, and from 1875 to 1876, he used the wet masses of carbolized or thymolized lint and jute, with a mortality of 29.5 per cent. From 1877

* On the Antiseptic Treatment of Wounds and its Results," by R. F. Weir, M. D., "New York Medical Journal," December, 1877.

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to 1880, under a strict antiseptic treatment, the mortality went down to 5.7 per cent.*

Volkmann,† too, in 261 amputations, had only 14 deaths, which is a five-per-cent mortality. and 108 of these healed by first intention, a condition which I had only seen once prior to the use of antiseptic. Neuber ‡ records also 105 capital amputations, with a mortality of 7.6 per cent. As a tribute to the latter surgeon's permanent dressings, it should be stated that in four of his cases only one dressing was used, Still more satisfactory is the employment of the permanent or peat dressing in 49 knee-joint re-sections, in 36 of which the dressing remained unchanged from the time of the operation until the parts were healed. He attributes his greater success in getting union in re-sections than in amputations to the imperfeet apposition of the muscular structures in the latter operation; and, in amputations, he therefore recommends the separate suturing of the muscles with catgut, under which procedure he got primary union in thirteen out of fourteen cases in which he tried it.

In my own practice, I find notes of thirty-five amputations without a single death, viz.: 1 hip-joint, 7 knee-joints, 7 thigh, 9 leg, 7 arm, and 2 forearm amputations. Two deaths following amputation for compound fractures have already been counted under those injuries. Should such be placed also in the list of amputations, the result would be 37 cases with 2 deaths, a mortality of 5.4 per cent.

With such results, I feel that I shall be pardoned for repeating words used on a former occasion, but now employed with a conviction deepened by increased experience: that "the saving of life which is thus indicated, occurring as it now does or ought to do over the whole world, should entitle the name of Joseph Lister to outrank in medicine all of century, not excepting the discoverer of anæsthesia."

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* "Die Amputationen an Professor Billroth's Klinik, 1877–'80." Wölffler, 1882.

† "Die Amputationen unter dem Einflusse der antiseptischen Behandelung." Oberst, 1882.

‡ "Eine neue Amputationsmethode." G. Neuber, 1883.

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AN IMPROVED METHOD IN THE TREATMENT OF CERTAIN FORMS OF SKIN AFFECTION.*

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THE method of treatment indicated in the title of this paper consists essentially in the application of medicinal substances to the skin in the form of fixed, adhesive preparations. Its object is to confine the application of the drug to the diseased surface alone, and to secure its continued action by maintaining it in prolonged contact with the tissues by means of a practically immovable dressing.

For the attainment of this object a number of procedures have been employed. First, applying the drug in the form of a powder or paste, and retaining it in position by means of a protective coating formed by a layer of collodion or a piece of gutta-percha tissue. Second, by an admixture of the drug with a gelatine mass, which is painted over the surface, forming a thin adherent layer, with the addition of glycerine to render it soft and pliable. Third, by the application of a thin layer of collodion or gutta-percha solution, holding the drug in liquid suspension. Fourth, by incorporating the drug with adhesive plaster muslin, the basis of which is gutta-percha, which are cut into convenient shape so as to admit of accurate adjustment to the effected surface.

*Read before the New York Academy of Medicine, February 21, 1884.

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I have designated these several contrivances collectively—since they are all designed to accomplish the same object—as constituting a new and improved method in the treatment of certain forms of skin affection. I have not the pretension to suppose that in the presentation of this subject I shall offer anything of novelty to dermatologists, who are, presumable, already familiar with this innovation upon established methods; yet to the profession at large, who may not have kept pace with recent advances made in this special field, I have thought that a brief exposition of these procedures might not prove uninteresting.

Although their introduction dates back one or two years, yet they may be regarded as substantially new, since they are not described in any of the recent text-books on skin diseases to which the general practitioner is accustomed to refer for information concerning the most approved plans of treatment. It is, perhaps, scarcely necessary for me to premise that I claim nothing original in connection with this method, only the endeavor to present, as concisely as may be consistent with clearness, the main features of its application, the conditions in which it is indicated, and an appreciation of its value based upon clinical results, derived partly from my own experience, but largely from the experience of others. Since these new devices for the topical application of drugs were brought to the notice of the profession, sufficient time has elasped to enable us to test their efficacy in a variety of cutaneous disorders, and I feel assured that of those who have experimented with this class of preparations, few will deny that their introduction marks a decided advance in cutaneous therapeutics.

In order to justify the claims for superiority alleged for fixed, adhesive applications in the treatment of certain forms of skin disease, it may be well to glance at the appliances hitherto employed for bringing drugs in contact with the cutaneous surface. As is well known, these consisted chiefly of powders, lotions, pastes, plasters, and ointments.

While these preparations admirably fulfill the desired indications in many cutaneous diseases, yet their use has al-

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ways been found to be attended with certain disadvantages. For example, powders, which are usually applied for purposes of protection, are easily rubbed off, and when employed for drying up an exuding surface, they frequently form crusts, which prove sources of irritation and aggravate the existing eruption. Lotions rapidly evaporate, necessitating constant renewal, otherwise they leave the skin dry, stiff, and brittle, thus occasioning much uneasiness and distress. Of pastes and plasters it may be said, that the former are used chiefly as a means of applying caustics and strong stimulants, and necessarily have a very limited application; while plasters as formerly prepared have never become popular as a means of applying drugs to the skin. The resins employed in the preparation of many plasters to give the requisite consistency act as strong irritants, often intensifying the inflammatory conditions present.

Ointments have been generally regarded as the most convenient and efficient means at our command for the external employment of drugs. But ointments are easily rubbed off, or absorbed by the clothing, and can only be efficiently employed by being spread upon lint or muslin, and kept in position by careful bandaging—a procedure which involves tedious manipulation, and is more or less cumbersome. As a curious illustration of the fashions which prevail in cutaneous therapeutics, the venerable Erasmus Wilson says: "When first I commenced the treatment of diseases of the skin, water dressings had just been introduced, and they suddenly became the surgical fashion of the day, while a general outcry was raised against ointments, 'greasy applications,' as they were contemptuously termed." While the use of ointments has fortunately survived this onslaught, yet it must be admitted that they will always be open to the objection that they are uncleanly and offend the tastes of our fastidious patients.

Ointments, too, often aggravate the symptoms they are intended to relieve; their irritating quality may be due to faulty preparation, gritty particles of the active ingredient may be present, an impure or rancid fat may have been em-

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ployed by the apothecary, or when properly prepared and applied, there may be a rapid decomposition of the fat, a reaction which is peculiarly favored by contact with the highly oxidizing surface always present in inflammatory congestions.

Another objection to ointments is that they do not have sufficient solidity or consistency for exclusions of the air and complete protection of the surface. In diseases in which the lesions are circumscribed, scattered, and separated by large interspaces of healthy skin, it is found impossible to restrict the application of oleaginous preparations to the seat of the disease. They have the inconvenient property of diffusing themselves over the surrounding healthy surface, and, when active drugs are used, causing irritation, oftentimes inflammatory reaction of considerable severity, and thus propagating the extension of the diseased process.

In thus indicating certain defects in the classic modes of applying drugs to the skin, I do not mean to detract from their real and acknowledged utility. In irritable, highly sensitive conditions, in acute generalized eruptions of an inflammatory character, they constitute our most valuable means of cure, and for which no equally efficient substitute has been found. Neither, on the other hand, do I claim that the introduction of fixed, adhesive applications is to revolutionize the external treatment of diseases of the skin. Their range of application is by no means universal, on the contrary, it is comparatively limited. In many skin diseases, the localization of the eruption, the high grade of inflammatory reaction present, and other conditions, render their employment impossible. The point I wish to emphasize is, that the older processes are by no means perfect, and that the new appliances, by securing greater precision and permanence of action, and by better fulfilling other indications which all authorities recognize as essential and important, constitute a most valuable acquisition to the methods employed in dermatological practice.

In this connection it may be incidentally remarked that cutaneous pharmacy has not kept pace with the improve-

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ments made in the form and character of the preparations designed for internal medication. In place of the crude drugs and nauseous mixtures formerly in vogue, modern pharmaceutical chemistry has placed at the disposal of the physician remedies which are palatable, pleasant, and efficient. While dermatologists have been actively employed in developing the virtues of new drugs, until recently comparatively little attention has been paid to improving and perfecting pharmaceutical processes by which the highest measure of their usefulness might be obtained without their countervailing disadvantages.

Among the many valuable drugs with which our cutaneous materia medica has been enriched within the past few years may be mentioned chrysarobin, pyrogallic acid, salicylic acid, naphthol, ichthyol, etc.

These new drugs, like many of the standard agents employed in cutaneous therapeutics, possess powerful stimulating properties, and when improperly used do positive harm. Clinical experience proves that it is not only necessary to have good drugs, but to know how to use them.

It is now generally recognized that chrysarobin is the most efficient agent known to the profession for the external treatment of psoriasis, and certain chronic diseases of the skin. The inconveniences attending its use in the form of an ointment have restricted its application and, practically, led in many instances to its rejection as a means of cure. The objectionable features were its property of staining the skin, hair, and nails, of indelibly dyeing every article of clothing with which it came in contact, but notably its irritating effect upon the surrounding healthy skin, and the frequent production of erythematous, furuncular, and erysipelatous inflammations. These decided inconveniences were the occasion of an effort on the part of dermatologists to devise means by which the superior virtues of the drug might be retained without its attendant disadvantages. This effort was so eminently successful in the case of chrysarobin, that its application has been extended to many other drugs, and has resulted in the building up of the class of preparations which form the subject of this paper.

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To Dr. Fox, of this city, belongs the credit of being one of the first to originate an expedient for confining the action of chrysarobin to the affected patches. Some two years ago (*Medical News*, March 18, 1882), he suggested the employment of this drug in powder, or mixed with water, forming a paste which was applied upon the psoriatic patch, and retained in place by a layer of collodion spread over the surface, or by covering it with a piece of gutta-percha tissue, the edges being rendered adhesive by touching them with chloroform.

This process, which involved considerable manipulation, and required much time and patience on the part of the operator, when the patches were large and numerous, was speedily substituted by another and more convenient method.

Seseman (*Monatshefte f. Praktische Dermatologie*, February 1, 1883) proposed the use of chrysarobin suspended in collodion, which is painted over the surface, forming a thin adherent coating. The medicated collodions now embrace a large number of drugs, and are used in a variety of conditions which will be referred to later. They have the advantages of being always ready for use, convenient of application, perfectly cleanly, and remain fixed upon the skin for some time.

Prof. Pick, of Prague, proposed (*Monatshefte f. Prakt. Dermatol.*, Bd. 11, No. 2, 1883) the use of gelatine dissolved in water as a convenient vehicle for the application of drugs to the skin. The formula for its preparation he gave as follows: 50 parts of pure gelatine are dissolved in 100 parts of distilled water, the active ingredient is added in any desired proportion, and thoroughly admixed by continuous stirring. This medicated gelatine may be immediately applied or turned into a convenient receptacle, where it solidifies into a cake. When required for use, portions of this may be melted in a shallow vessel placed in hot water. It is then applied by means of a short, stiff brush over the surface in a thin layer. A small quantity of glycerine is smeared over the gelatine coating with the hand, which prevents

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it from drying and cracking. This thin, flexible dressing remains fixed to the skin for a day or two, and may be peeled off, or readily removed by the use of a little hot water. In addition to its cleanliness and other advantages, it is claimed that a view of the diseased parts may be had through the transparent dressing, thus rendering the progress of the disease visible without removing the application. I have found, however, that this transparency is rather an uncertain element, depending altogether upon the character of the medicament employed.

Prof. Unna, of Hamburg, proposes (*Monatshefte f. Prakt. Dermat.*, vol. xi., No. 2) a modification, which in the matter of convenience may be regarded as an improvement upon Pick's plan. It consists in combining the glycerine directly with the gelatine before it is spread upon the surface. The glycerine jelly is made by boiling one part of gelatine with three or four of glycerine, until they form a translucent mass. When required for use, a portion of this mass is liquefied by heating, the medicinal ingredient, being finely rubbed up with water or glycerine, is then added, and the resulting compound well shaken until it becomes a tenacious fluid. He employs the gelatine in varying proportions, resulting in the formation of hard and soft glycerited gelatines, containing respectively five, ten, and twenty per cent. of gelatine. The author, in conjunction with Beiersdorf, has made a number of careful experiments with the view of ascertaining the exact combining proportions of various active ingredients, and gives a series of tables embodying the results.

Dr. Mitchell, of Philadelphia, manufactures a number of medicated gelatine plasters, which are put up in quite a convenient shape. The gelatine and glycerine compositions, with which a variety of drugs have been incorporated, are moulded in solid rolls, and when required for use a portion may be cut off, liquefied by heating, and applied with a brush. I have experimented with his preparations of chrysarobin, tar, pyrogallic acid, iodoform, oxide of zinc, etc., and with very satisfactory results. The only objection I

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have found is that they deteriorate in keeping, and are apt to become mouldy, which defect could, no doubt, be overcome by a larger admixture of gelatine, or by a small quantity of salicylic or carbolic acid. The gelatine preparations which I now employ are made for me by Hayes & Sons, druggists, of this city.

Professor Auspitz (*Medicinische Klin. Wochenschrift*, Nos. 30 and 31, 1883) proposed the use of a vehicle, which he terms traumaticin, as more convenient than either collodion or gelatine in the application of chrysarobin and certain other drugs, as pyrogallic acid, salicylic acid, etc. This consists of a ten per cent. solution of refined gutta-percha in chloroform, and corresponds to the liq. gutta-perchæ, U. S. Ph. Among the advantages which he claims for traumaticin as an excipient may be mentioned the following: It forms a thinner and more delicate artificial cuticle than either gelatine or collodion: it is more durable, adhering to the skin two or three days or longer without cracking; it is neutral and unirritating, causing neither tension nor pain; it is more elastic, its flexibility admirably adapting it as a covering for the joints, as it yields readily to the motion of the parts; it is always ready for use, and, as it hardens more slowly, it admits of a more thorough application.

Finally, may be mentioned another method for the topical application of drugs, viz.: gutta-percha plasters. Although not absolutely new in form, yet in their composition, impermeability, adhesiveness, and other qualities, they constitute a decided improvement upon the lead and resin plasters. These preparations, introduced by Beiersdorf upon the recommendation of Professor Unna, consist of plasters spread on muslin, the basis of which is gutta-percha, combined with different drugs in varying proportions, some emollient, others strongly stimulant. They possess decided advantages in cutaneous disorders localized in certain regions, such as the palms, soles, fingers, toes, and interdigital spaces, on parts habitually in contact, such as the eczemas of the anus and genital regions, the crease of the thighs, etc. They are cut into narrow strips or other convenient shapes, so as to admit of accurate adjustment.

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Having thus described the new modes of applying drugs to the skin, it remains for us to examine the verdict which clinical experience has passed upon their value. As before intimated, this class of preparations was the outcome of an attempt to obviate the ill effects of chrysarobin—a drug which, while possessing a wonderfully curative action, was found to be equally potent for mischief. By its employment in any of the fixed forms above mentioned its obnoxious qualities are entirely suppressed, without impairing its efficacy in any marked degree.

In the treatment of psoriasis, all who have experimented with the drug in these combinations agree that the results are much more brilliant and satisfactory than by any other method of treatment. Referring to its combination with collodion Dr. Fox (*The Æsculapian*, February, 1884) says: "Now it is a comparatively simple matter to cause a speedy disappearance of the scales in nearly every case. And it is another step in advance which has superseded the ointment of chrysarobin by applications of the remedy which do not ruin the clothing and inflame the healthy skin." He has found that the efficacy of chrysarobin collodion is materially enhanced by the addition of ten per cent. salicylic acid.

"In chronic eczema of the trunk and extremities, where there is much thickening of the skin with no moisture on the surface," Dr. Fox claims "that the compound chrysarobin pigment will produce as rapid and beneficial effects as in cases of psoriasis." He has also employed this combination in lupus erythematosus, in acne of the back, and in other diseases, with good results.

Auspitz (loc. cit.) reports admirable results from the use of his traumaticin chrysarobin in the treatment of psoriasis. After from two to twelve applications, according to the extent and severity of the disease, the infiltration and scales disappear, leaving in their place white spots bordered by a red or violet-brown line.

He gives a detailed report of a number of cases in which the psoriatic process was stopped after a short series of applications made daily or every second day. He claims that

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the most satisfactory results are obtained by the same treatment in prurigo, in eczema marginatum, and other parasitic diseases. In prurigo the application of the chrysarobin traumaticin immediately relieved the itching and in a few cases, after from two to six applications, the nodules had disappeared

Dr. E. Besnier, of the Hospital St. Louis (*Annales de Dermatologie et de Syphilographie*, January 25, 1884), after extolling the superior efficacy of this mode of treatment in ordinary cases of psoriasis with moderate infiltration, proposes a modification of Auspitz's plan, which he employs when the patches are larger, the infiltration deeper, and the scales thicker and more abundant. After removing the scales, he vigorously rubs the patches with a small brush of hog bristles, dipped in chloroform containing fifteen per cent. of chrysarobin. The chloroform rapidly evaporates, leaving a deposit of pure chrysophenic acid. This is then covered with a coating of traumaticin by means of a flat varnish-brush. He also employs an ethereal solution of pyrogallic acid, ten per cent., in the same manner. He regards naphthol as admirably adapted for employment in the gutta-percha solution, constituting an instantaneous means of destroying animal parasites.

Dr. Pick (loc. cit.) reports equally favorable results in psoriasis from the use of the glycerited gelatine, medicated with ten per cent. of chrysarobin or twenty per cent. of pyrogallic acid. He has found the glycerine applications of especial efficacy in the treatment of chronic scaly eczema, and eczemas associated with varicose veins. In erythematous conditions due to the action of the cold, glycerited gelatine containing five to ten per cent. of salicylic acid has been applied with advantage, particularly in frostbites of the ears, nose, and fingers, the layer of gelatine exerts an equable and gentle pressure upon the parts, and in this way hastens the absorption of inflammatory products. He also extols the salicylated and carbolated preparations in pruritus, both idiopathic and symptomatic.

In Billroth's clinic (*Med. Times and Gazette*, November 10,

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1883), iodoform collodion is used in immense quantities, and is regarded as a sovereign remedy in fresh cuts and bruises. Iodoform and corrosive sublimate collodions are used for condylomata and syphilitic scleroses.

Dr. Taylor, in the last edition of Bumstead and Taylor "On Venereal Diseases," states that he has employed the compound chrysarobin pigment with benefit in hypertrophic and vegetating papular or tubercular syphilides.

Dr. Thin reported before the Clinical Society of London, November 23, 1883, a number of cases of thickened, hardened epidermis occurring upon the hands and feet, which were effectually relieved by salicylic gutta-percha plasters. In some of these cases the condition had lasted for years, interfering with locomotion and occasioning great discomfort. In one case the whole ball of one foot and part of the surface of the other was covered with a layer of epidermis of extreme hardness. In this hard layer there were small isolated horny formations of the nature of corns, which produced the sensation as if the patient were walking on shot or small stones. By the use of the salicylic gutta-percha plasters the hardened mass came off, leaving a delicate rose-colored epidermis. The cure is effected without inconvenience or pain, or interfering with the ordinary avocation.

I have experimented with these preparations in a variety of cutaneous disorders, and for the most part, with satisfactory results. My experience in the treatment of psoriasis coincides with the brilliant results already given. In psoriasis affecting the face and hairy scalp, I have applied the chrysarobin to affected patches without exciting conjunctivitis, œdema of the face and eyelids, and other ill effects inseparable from the use of the drug in ointment in these localities.

I have found these combinations particularly serviceable in chronic eczematous disorders, especially when characterized by thickening and induration of the skin with excessive pruritus. Even in a more acute stage, when there is active congestion with exudation, the use of the gelatine, medicated with ten per cent. oxide of zinc, has given good results.

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I have also used the same preparation with decided benefit in a number of cases of eczema rubrum of the legs. I shall not attempt to give a detailed report of these cases of eczema, but will briefly refer to the results obtained in one case, which may be regarded as typical. The patient was an old gentleman, who had suffered for many years from chronic eczema, involving the face, genitals, and other portions of the body. The skin of the face was much thickened and infiltrated, giving it an almost elephantiasic appearance. Exposure to the cold caused it to crack and fissure, especially around the nostrils and the angles of the mouth. The itching was positively atrocious, the patient being unable to sleep, and in a constant state of the most acute discomfort. The various emollient and antipruritic ointments failed to give more than momentary relief. A single application of the gelatine, medicated with ten per cent. oxide of zinc and one per cent. carbolic acid, gave instantaneous and complete relief, which lasted for several hours, until the artificial cuticle began to crack from constant movements of the facial muscles. Not only was the itching relieved, but the vigorous rubbing and scratching which the patient before could not control, and which continually aggravated the eruption, was entirely done away with. After a few days' daily painting with this preparation, the cracks and fissures healed, and the induration had almost entirely disappeared. A feature of this case furnished a fair test of the comparative advantages of the new and old method. Over the eyelids the gelatine coating could not be applied, for obvious reasons, and the orbital surface was treated with oleate of bismuth ointment. After a few days' treatment, one could trace by the touch alone, the exact line at which the gelatine coating terminated; above this line the skin was harsh, dry, and thickened; below, it had the soft, supple feel of healthy skin.

I have used a five per cent. salicylic acid collodion in acne rosacea and chronic erythema of the face with good effect, and a stronger preparation for corns, warts, and tylosis of the hands and feet. I have also used chrysarobin suspended

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in collodion, and the gutta-percha solution in two cases of chromophytosis, and in a number of cases of tinea capitis. In addition to the remarkable antiparasitic action of chrysarobin, we secure more or less complete occlusion of the surface, thus preventing the access of oxygen, so favorable to the growth and development of the parasite.

As regards the comparative advantages of the different excipents which have been proposed for the fixation of drugs upon the skin, not all experimenters agree. My own experience leads me to the conclusion that each possesses special advantages, determined by the nature of the diseased process, the character of the circulatory changes present, its sensitiveness, localization, etc. In extensive generalized eruptions, when the skin is actively congested and sensitive, the gelatine preparations are the most soothing and easily borne; both collodion and traumaticin cause more or less pain, tension, and irritation.

In chronic disorders, where there is passive congestion or sluggishness of the circulation, the more continuous and decided compression exerted by the collodion combinations renders them preferable. Upon mobile parts, such as the region of the joints, the gutta-percha preparations, from their greater flexibility and elasticity, are to be preferred. As far as manipulative details are concerned, the collodion and gutta-percha preparations are superior in the matter of convenience and ease of application, besides being always ready for use.

In concluding this paper, which has extended much beyond the limits proposed, a summary of the advantages offered by fixed, adhesive applications may be given as follows:

First, complete protection, and exclusion of the air from the diseased surfaces.

Second, fixation of the drug upon the affected parts, thus securing greater precision and permanence of action.

Third, maintenance of a gentle and uniform compression, thus modifying circulatory changes and limiting exudation products.

Fourth, comparative cleanliness.

It may, perhaps, be considered premature to pronounce

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positively upon the merits of these preparations, or to decide definitely their range of therapeutic application, yet a careful study of the results of their use in the hands of others, supplemented by my own experience, justifies me, I think, in formulating the following conclusions:

First, that the introduction of fixed, adhesive applications in the treatment of certain forms of skin affection, marks a veritable advance in cutaneous therapeutics.

Second, that they are admirably adapted for the employment of certain powerful stimulating drugs recently introduced into dermatological practice, as well as other standard drugs.

Third, that they constitute the most effective mode of applying drugs in certain pathological conditions characterized by hyperæmia of the derma with inflammatory overgrowth of the epithelial elements, as in psoriasis and dry, scaly eczema.

Fourth, in conditions characterized by hyperplasia of the cuticle, as in callosities, corns, and over-growths of thickened, hardened epidermis, etc.

Fifth, in conditions of capillary congestions of a passive character, as in acne rosacea, chronic erythema, etc.

Sixth, in certain neurotic conditions, not only in essentially prurigo diseases, as prurigo, but in the pruritus, symptomatic of other affections.

In circumscribed lesions generally, as tinea circinata, tinea capitas, eczema marginatum, chromophytosis, syphilitic sclerosis, lupus, and possibly, epithelioma.

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A PLEA FOR THE USE OF DELICATE TESTS FOR ALBUMEN IN URINE.*

By GEORGE B. FOWLER, M.D.,

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WHETHER, in every instance, the presence of albumen in urine, in any proportion, is necessarily the signal for an alarming prognosis, is a question destined to receive much attention in the near future. Yet, whatever be the verdict, I am convinced that albuminuria is not a physiological condition. And, while many apparently healthy people may present this symptom in a given case, we certainly are not yet prepared to say what will be the ultimate result.

To be in perfect health implies a condition easier to comprehend than define. Many trivial indispositions connected with various organs have, from their tendency to pass off, taught us indifference. But ignorance on the part of the patient of the possible significance of his slight symptoms, and failure or inability of the physician to apply minute methods of investigation, have too often proved the source of future regret and disaster.

If we are dealing with a supposed "functional" case, and look anxiously for the gradual disappearance of the morbid chemical reaction of the urine, how much more does it not behoove us to be familiar with those delicate processes, by whose means we shall be enabled to follow the intruder across the pathological territory, and back into physiological bounds.

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* Read before the New York Academy of Medicine, March 6, 1886.

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And, moreover, if it is ever to be established that a trace of albumen in the urine is compatible with health, it will be by a skillful use of the more delicate tests. I am, therefore, not in harmony with those who say that heat and nitric acid are sufficient; for this is equivalent to the dogmatical assertion that where these reagents fail there is no albuminuria. It is a significant fact, in this connection, that neither albumen nor any of its allied compounds are met with, under normal conditions, in any of the excretions. In fact, the loss of these substances is expressly guarded against by one of their characteristic qualities, namely, indiffusibility.

The only albuminous derivatives capable of ready transudation are peptones; yet, although these are produced in such great quantity in the stomach and intestines during digestion, their loss is prevented by the provision that they must pass through the liver before entering the general circulation. In the liver they are transformed into matters having no tendency to escape.

As regards the reagents most to be relied upon in testing for albumen in urine, I will simply say a word, for much has recently been written upon this matter.

In order to determine the comparative delicacy of some of the methods, I used the serum of ox-blood, carefully drawn from a firm clot, and mingled it in varying proportions with normal urine. Now, the composition of this serum is as follows: Water, 90 parts; proteids, 8; fats, salines, etc., 2=100 parts.

The proteids consist of two forms of albumen, *serum-albumen* and *paraglobulin*, in about equal proportions. As these two substances are always associated in albuminous urine, and respond to the tests to be enumerated, their distinctive qualities need not be dwelt upon, and they are together reckoned as albuminous. But the trial solutions having been made with serum and water, in order to know the proportion of *albumen* detected, we must go through with a little calculation based on the proportion of albumen present in the serum. This has been done, and the results, as given below, are for albumen calculated as dry. I speak

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of this because most of those who have gone over this ground leave us in the dark whether with any given method (having used serum or white of egg) the percentage detected means the percentage of serum or white of egg respectively, or the actual proportion of albumen present.

As a result of numerous and very careful trials with heat, nitric acid, picric acid, acidulated brine, potassium, ferrocyanide and acetic acid, potassio-mercuric iodide, and other methods, I found the following to be their respective capabilities:

Heat, in neutral solution, fails with .018 of one per cent.; in slightly acid solution, reacts with .018 of one per cent.

Acidulated brine, about same delicacy as heat.

Picric acid, if carefully applied, will detect .008 of one per cent. But being of low specific gravity, it is sometimes difficult to employ the contact method with it. Its decided yellow color masks its effects and interferes with its delicacy.

Nitric acid is satisfactory with an .008 of one per cent. solution of albumen, if the contact method is employed. The greater the diameter of the test-tube, and the longer it stands perfectly still, the more marked is the ring of coagulation.

Potassium, ferrocyanide, and acetic acid.—The urine being first made decidedly acid, and then a few drops of the ferrocyanide added, feint clouds of opalescence will be seen in an .008 of one per cent. solution of albumen.

Potassio-mercuric iodide gives a very manifest reaction with a .004 of one per cent. solution, and, hence, is the most delicate of all.

It should be borne in mind that both picric acid and the potassio-mercuric-iodide solution, also precipitate peptones, quinine, morphia, strychnia, and perhaps other alkaloids, and the former may throw down the urates. All of these precipitates, however, completely disappear on heating the solution, thereby enabling us easily to distinguish them from albumen.

These percentages may seem to some very small and not

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worth detecting; but I contend that, pathologically considered, they are by no means insignificant. Let us look at it practically. Serum contains about eight per cent. of albumen (or proteids precipitable by the foregoing means). We pass about 1,500 c.c. of urine per day, and urinate about six times. That would be about 250 c.c. for each time. Now, 1 c.c. of serum in each of these voidings, or 6 c.c. in the whole, would give us .031 of one per cent. of albumen.

So we see that, although the percentage of albumen may be down among the thousandths, an appreciable quantity of blood-serum is thereby represented. And, to my mind, the leakage of 6 c.c. of serum through the kidneys per day is abnormal, and suggests danger ahead. At any rate it is well to be able to know it, so as to keep a sharp lookout.

For those who may desire to learn more regarding the origin and development of these new tests, and who are not familiar with the precautions to be observed in their application, I append a brief bibliography:

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SYPHILIS AND LOCOMOTOR ATAXIA.*

By LEONARD WEBER, M.D.

THE pathologists have not succeeded as yet in demonstrating a syphilitic sclerosis of the posterior columns of the cord, but clinically the question of a causal nexus between syphilis and tabes in so far as the presence of the former will often create a predisposition to acquire the latter, has assumed considerable importance. The numbers of observers who believe in a syphilitic origin of many cases of tabes is large, probably larger than of those who deny it, but the latter have among them men of great acumen and experience; and the question being far from settled, the practitioner has the privilege as well as the duty to contribute his mite of experience in the matter at issue.

In former years the search for syphilitic lesions of the central nervous system in the dead body was limited to the brain; and the cord generally was forgotten, or rather neglected on account of the difficulty and loss of time which is met with in its dissection. Although Romberg, Wunderlich, Virchow, and others, spoke of syphilis as an etiological factor in tabes in the seventh decade of this century, no modern clinician was as emphatic in pronouncing his belief in syphilis producing an ataxia of its own as A. Fournier, 1876.

The proofs he furnished for this assertion are mainly statistical; he does not deny that these are typical and atypi-

* Read before the New York Academy of Medicine, March 20, 1884.

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cal cases of syphilitic tabes, the same as in tabes from other causes, and that there are no pathognomonic symptoms of syphilitic ataxia. From a diagnostic point of view, he puts great stress upon the "types incomplets," the incomplete and irregular forms of syphilitic tabes, and distinguishes: 1. The lumbar or exclusively spinal type, in which the cer ebral nerves are not affected. 2. The cephalic type, where the cerebral nerves participate. 3. The ophthalmic or amaurotic type. It is hardly necessary to say that we meet with Fournier's "types incomplets" in ordinary tabes as well as in that of supposed syphilitic origin, but his experience, that tabes does often occur in cases where there are other specific lesions of the nervous system, or may follow the latter, is an important observation. Grasset and Vulpian, Féréol and Siredey, hold similar opinions; Hammond mentions syphilis as a very probable cause of tabes, and Hutchinson repeatedly speaks of syphilitic ataxia.

Within the last four or five years the Germans have given much attention to the etiological connection between syphilis and tabes, and O. Berger, 1878, and Erb, 1879, were the first, I believe, who studied the question clinically. Berger is convinced that many cases of tabes are of syphilitic origin. Erb believes that constitutional syphilis often creates a predisposition to tabes, and accepts Fournier's tenets, that in all cases of ataxia that have syphilis included in their history, specific treatment should be applied tentatively.

The question of syphilitic localization in the cord in such cases, or of the presence of a *specific* sort of sclerosis, he leaves for future pathological research to decide. I conversed with Erb a few weeks before he published his first paper on the subject in "Deutches Archiv. fur Klin. Med., xxiv. 1879," and perceiving the clinical importance of the matter, I have since written up the history of cases past and present I have had in my practice, and inquired into their bearing upon this question. Erb's views, though supported by a formidable array of statistics, were not received with great favor at the International Medical Congress held in London, 1881, and the experience of the majority of physi-

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cians engaged in the discussion of his paper did not seem to coincide with his own.

At the meeting of neurologists and alienists, in June, 1883, at Baden-Baden, Erb reports again 100 cases of tabes dorsalis, in the etiology of which all important factors had been examined into, and finds syphilis to be the main predisposing cause; 91 of the 100 cases had chancre and syphilis respectively; 9 had had neither. 69 developed symptoms of ataxia during the first 15 years of infection; 15 between 16 and 20 years thereafter; the others still later. The same, or nearly the same results, are given in the statistics of Fournier, 90 per cent.; Rumph, 66 per cent.; Voigt, 81 per cent.; and G. Fisher, 92 per cent., of 1,200 individuals, all over 25 years of age, and afflicted with various disorders, except locomotor ataxia, only 22.75 per cent. had syphilitic antecedents. In 3 only out of 109 cases of locomotor ataxia, rheumatic influences were thought to be the only cause; and severe and prolonged exertions alone, in two cases only. Sexual excess and trauma had but little influence in producing tabes, myosis, and particularly the Robertson pupil, as well as the paralytic affection of the muscles of the eyeball—symptoms that occur by themselves mainly in syphilis—also speak for the syphilitic character of tabes. Tabetic women frequently have syphilitic history. Erb finally says: Tabes is probably a syphilitic affection, the development and local area of which are determined by predisposing causes.

Benedict of Vienna is a firm believer in syphilitic tabes, and says that it is particularly apt to develop in those individuals who have suffered much from specific cutaneous lesions. Why syphilitic exanthemata and ulcerations of the skin should be followed by tabes any more than non-specific chronic exanthemata and ulcerations, the frequency of which is manifest, I fail to see. My experience thus far has not taught me the existence of any such connection.

Among those who deny either a causal connection of syphilis and tabes, or hold their opinion in reserve, we find Moxon, Guy's Hosp. Reports, s. iii., vol. 16, 1871, ready to

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deny the etiological influences of syphilis in tabes, as he has not found a trace of syphilitic lesions in 17 autopsies of cases of posterior degeneration of the cord.

Lancercaus, in his well-known work, 1873, treats of myelitis syphilitica, but not of syphilitic degeneration of the posterior columns. Westphal, in a discussion on the subject, Berlin Klin., Woch., 1880, p. 141, says that the autopsies of tabetic individuals, as well as the statistics within his reach, militate against the etiological connection of syphilis and tabes. Again, in a second paper on the subject, in the Arch. fur Psych. & Nervkrk., xii., 1880, p. 230, he comes to the conclusion that no sufficient pathological nor clinical proofs have been as yet brought forward to make the etiology between syphilis and tabes certain or even probable. M. Rosenthal: Wien. Med. Presse, 1881, Nos. 3, 6, 7 and 9, is as decided as Westphal in his opposition, finds that the other parties have used the statistics to suit their particular views, and among his cases of tabes after syphilis, he cites 7 in which the symptoms of specific myelitis were greatly improved by specific treatment, while the clinical features of ataxia remained as before. He maintains that the therapeutic results in typical tabes after syphilis are as imperfect and unsatisfactory as in the cases uncomplicated by it, and that remissions occurred in the course of galvanic and hydriatic treatment in the specific cases as well as in the others.

Among the French it is particularly Tuillard, Étude crit. sur la local. de la syph., Paris, 1879, who, from the standpoint of pathological anatomy, is opposed to Fournier's views. Spinal syphilis is always diffused, he says, and does not affect a system of columns exclusively, and consequently it can not be the direct cause of posterior sclerosis. That diffuse spinal syphilis may give rise to ataxic symptoms, he does not consider unlikely.

In looking over the statistics of tabes in the course of syphilis, we are surprised by the enormous difference in the percentage reported by the various authors. Here we have Eulenburg with 0.5 per cent.; Westphal with 14.6 per cent.;

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M. Rosenthal, 18 per cent.; O. Berger, 20 per cent.; Remack, 21; Gowers, 70.53, with secondary symptoms and 17 with chancre only; George Mayer, 70; Fournier, 80; Erb, 88.59 of them with secondary syphilis, and in his last report 91; A. Reumont, syphilis and tabes dorsalis, Aachen, 1881, 36 cases of ataxia with a syphilitic history. In paralytic dementia, which we know to be not rarely associated with tabes, Mendel and others have found no less than 75 per cent. with a history of syphilis.

How are we to account for this remarkable difference in the statistics and opinions of authors? It is reasonable to presume that, until quite recently, the inquiry into the syphilitic antecedents of tabetic patients had not been carefully made. It is quite certain that specialists like Fournier, and physicians practicing at certain watering places, where many syphilitic patients come for treatment, like G. Mayer, Voigt, and others, will have a much higher percentage than other practitioners. Erb's and Gower's high figures would show that they have been particularly searching in their inquiry into the antecedents of their tabetic patients, and satisfied to attribute the spinal disorder to syphilis, where the latter was present in the history of the patient.

These statistics prove one thing beyond doubt, i.e., that syphilis occurs frequently in the anamnesis of ataxia, and corroborate the fact, which is more and more appreciated, I hope, that syphilis is a wide-spread affection, and *on the increase*, and that in persons afflicted with it serious lesions of the central nervous system occur, which, perhaps, would not develop, if they had not the syphilitic cachexia. Sigmund, Wiener, Clin. fur syph., 1878, p. 33, having probably the largest material under observation, gives the statistics of cases of syphilis treated in the course of 28 years, from 1849 to 1876. They go to show that syphilis is on the increase relatively and absolutely, and he is constrained to say that it is the worst of all diseases affecting humanity, because the most insidious, poisoning the present and tainting the future generations; a statement in which I fully

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concur after an experience of more than 20 years in practice among all classes of society, and the importance of which for practical purposes was recognized in the discussion on an interesting paper read about two years ago before this academy by Dr. Sturgis. We are not satisfied with the history of any serious case unless accompanied by a thorough test of the patient's urine, and the practitioner who, in chronic and puzzling cases, is not on the lookout for syphilis as a causative or complicating element, and will not carefully try to eliminate it by getting a true statement from the patient, or by tentative therapeutic measures, will often meet with unpleasant surprises where he least expects it. If, therefore, we rank syphilis among the important predisposing or inciting causes of tabes we shall be not far from the truth.

I should not like to leave this part of the subject without saying something about the influences of masturbation upon the central nervous system when its practice is begun at the age of puberty and continued for one or more years. There are some who make light of its somatic effects, thinking it affects the psyche only. While I do not deny that it may and does produce more or less serious mental disturbances, particularly in those with neurotic taint, its hurtful effects upon the chord and sympathetic can be plainly seen in those cases of neurasthenia and malnutrition in the adult in which our examination elicits the confession of protracted early indiscretion, but fails to disclose other morbific influences. More important than the loss of semen appears to me the debilitating influences of the frequent excitement of the sexual organs in the masturbator, as well as the frequent nocturnal emissions which persist for a long while after he has discontinued the vicious habit, in exhausting the cord and brain, and by excessive irritation and subsequent malnutrition creating a predisposition not only to functional but organic disease of either or both. This latter consideration explains to me why the female masturbator may suffer from the effects upon the spinal cord as well as the male, while regret and shame of being guilty of a con-

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temptible act, increased by the impotent rage in not being able to overcome the passionate desire, prepare the way for the development of mental depression or some form of psychosis. I have seen in my practice, at all events, a few cases of locomotor ataxia, in the anamnesis of which masturbation in early youth was found to have been the foremost cause. A disease as widespread and of such baneful influences upon the constitution as syphilis, cannot fail to show itself in the etiology of a multitude of severe organic disorders, and those of the nervous system are not the smallest in number. Reumont, for example, found among 3,400 cases of syphilis, 290 8.5 per cent., with affections of the nervous system, which he believes to be of specific origin. This table shows how important it is, from a therapeutic point of view, to examine as to syphilis in all cases of initial tabes, for the reason that our therapeutie effects are almost always nill, when the disease has reached the ataxic stage, no matter what the cause may have been. My own cases of syphilis, observed through a period of twenty years, show but very few cases of tabes up to now in any of them; my cases of typical tabes are but a small number, but it is singular, nevertheless, that syphilis occurs in the antecedents of only a few of them. But were it otherwise, I do not believe in a specific posterior sclerosis, i.e., caused directly by the syphilitic virus, until pathological inquiry has given us some evidenee of its existence; yet I acknowledge that syphilis occurs in the history of a large percentage of tabetic cases, reported by trustworthy observers, and believe that on careful examination it will often be found of prominent etiological moments in the pathogenesis of the disease, creating a predisposition like mental and physical over-exertion, excesses, etc.

From a clinical standpoint tabes often presents so complex a picture of regular and irregular symptoms, that great difficulties may arise in deciding which of them depend upon syphilitic lesions of the cord. Charcot, Erb, and other authors, from numerous facts observed of late, are led to the conclusion that the typical form of tabes is

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not alone produced by disease of the posterior columns, but that the neighboring parts of the lateral columns and the posterior gray horns are also affected. If this be true of the typical, it is the more so for the atypical cases, which are more often seen in syphilitic patients than the former, and in which various lesions may be found in the cord and meninges. There is no reason why syphilis should not attack the cord as much as the brain, and I have no doubt that, as our study of the specific lesions of the medulla spinalis advances, it will be found that they occur there perhaps as frequently as in the brain. Virchow, in his onkology, ii., p. 438, says as long as eighteen years ago, "the entire, and probably pretty large, domain of the simple *irritative* processes wait yet for satisfactory explanation as to their effects upon the central nervous system. Observations in that direction have only commenced, although it is hardly doubtful that some cases of tabes are of syphilitic origin." This sentence holds good to-day to a great extent. Foreign observers have furnished sufficient proof of late, I think, that cardiac hypertrophy and endarteritis in chronic nephritis are due much more to the irritative action of the poisoned blood than the diminution of the area of small blood-vessels in the diseased kidney.

Now, in sclerosis of the posterior columns we have a chronic form of inflammation, hyperplastic in character, either occurring primarily in the connective tissue of the medulla or of the leptomeninges and adventitia of the pia-vessels. I think it quite probable that in constitutional tabes the irritative action of the syphilitic blood may have started the degeneration, when other conditions are favorable to its development. At the last annual meeting of the American Neurological Association, in June, 1883, Dr. Mills, of Philadelphia, said that in comparing the inflammatory changes he had seen in the spinal meninges, as well as the cord, in certain cases of ataxia, with the symptoms in their earlier stages, he had become persuaded that the posterior sclerosis is perhaps in many cases of leptomeningitic origin. Similar views were held by other members present. The

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more we learn of tabes at the bedside and through autopsies, the more the conviction is forced upon us that, pathologically and clinically, it is rather of protean form of disease. There is, 1. The typical primary posterior sclerosis, the most terrible form, and as intractable to-day as when Romberg drew its gloomy picture years ago, uninfluenced also by specific treatment when there is a combination with syphilis. 2. As chronic posterior atrophy of the cord, I should like to designate a second form of tabes, depending upon slow atrophy of medullar nerve elements and slow proliferation of perivascular connective tissue, characterized by initial asthenia and gradual loss of muscular tone, and diminution, but not abolition, of tendon reflexes, various rheumatoid pains, often recurring, but neither severe nor of long duration. Paræsthesias about rectum, bladder, and sexual organs, in various articulations, particularly the knees and wrist joints, also the heel, which I have found the seat of pain, spontaneously and on pressure. As trophic changes I have noticed attenuity, dryness, and loss of turgor of the cutaneous tissues, alopecia, more or less marked anæmia. There is no *real ataxia*, and the patients can stand and walk pretty straight with eyes closed, but not as well as healthy persons. The peripheral nerves seem to participate in the atrophy somewhat, for I have often felt the ulnar nerve to be decidedly thinner in such patients than in healthy persons of corresponding size. The objection that such cases are simply aggravated neuræsthenia depending upon functional disorder of the cord, I would answer that spinal neuræsthenia, unless hereditary, generally concerns persons who have previously been healthy, and may become so again by timely and proper treatment, while the individuals above described never get normal health or strength, hardly ever develop into normal man or womanhood, but, reduced in intellectual and moral qualities, are led into premature old age by spinal disease. This form of spinal malnutrition, frequent in my experience, I believe occurs mainly in adults between 30 and 40 years old, with a history of free and prolonged indulgence in masturbation at

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the age of puberty. It is of very slow growth, apt to remain stationary in its main features for years, and amenable to galvanic and medical treatment. Such patients are apt to succomb more easily to intercurrent acute diseases, having but little if any reserve force, and they must avoid all physical strain and be as moderate as can be in sexual intercourse for fear of advancing the degeneration of the cord.

3. As a third form we would designate the irregular and mixed myelitic or meningo-myelitic types of tabes, in the etiology of which the *syphilitic* and other asthenias, metal-poisoning, trauma, and disease of the spinal vertebræ, are important elements. It is mainly in these atypic cases where a temporary or permanent cure of the tabetic trouble is often effected by specific treatment, when syphilis has been suspected or found to be present in the history of the case. Neither the second nor the first form do I as yet believe to be ever directly caused by the syphilitic virus for the reason that the invasion of extensive and entire systems of nerve-tracts by the poison, so as to produce degeneration en masse, has not been demonstrated. In Reumont's valuable treatise on the subject, I came across a communication by letter, sent to him by O. Berger, of one case of characteristic ataxia in a military officer, developing in the course of syphilis, which was apparently cured by a thorough mercurial course.

Diagnosis.—Experience having shown that the clinical symptoms of specific and non-specific lesions of the central nervous system are generally the same, the differential diagnosis in most cases will have to be made ex-jurantibus; although Wunderlich and Heubner say that the irregular types of tabes characterized by early loss in weight and motory power, the instability of the disturbances in the sensory and motory sphere, and the rapidity of their development, are indicative of syphilitic origin. Also by the symptoms of meningitis, such as an irritable or painful spine, by simultaneous mental disturbances, paresis of cerebral nerves. But ataxia, according to Erb, is not well marked in cases of tabes caused by syphilis.

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It has been observed of late that in many cases the outbreak of constitutional disturbance is preceded by considerable diminution or abolition of the patellar tendon reflex.

That Romberg's sign is one of the most constant and regular in tabes is accepted by all prominent authors, and that the absence of tendon reflex is not an absolutely constant symptom, has been proved by O. Berger and H. Fischer, Med. Centralblatt, 1879, iv., although nearly all are agreed that Westphal's sign is fully as important in the diagnosis of posterior degeneration, if not more so, than Romberg's; Langenbeck, Westphal, Berl. kl. Woch., 1879, No. 40, and 1881, No. 8, published a case in which the pathognomic symptoms of tabes were present during life, but no degeneration of the posterior columns was found at the autopsy.

Prognosis.—The prognosis of tabetic cases in which syphilis has been recognized as the most important etiological factor is relatively favorable when the syphilis is not of very long standing, when they are of irregular type and re-act promptly upon specific treatment; unfavorable when the opposite conditions prevail. Benedict says that in cases of syphilis of the cerebral nervous system he has often succeeded in ameliorating or removing the spinal symptoms while the cerebral trouble remained either stationary or continued its progress. Other observers, Reumont among them, have had similar experience.

Treatment.—The therapeutic results have thus far been far below the sanguine expectations of the positivists; yet there is a respectable number of tabetic cases with a syphilitic history greatly improved or brought to a standstill, and a few even cured by specific treatment. Fournier has 6 cured and 4 improved among his own, and 4 from other sources. Erb, 3 improved, 2 unimproved, none cured; Lewin and Benedict believe in thorough mercurial treatment. On the other side we learn that M. Rosenthal has seen an aggravation of the tabetic symptoms after specific treatment in 7 cases, and Westphal knows of no case that has been cured, but does not condemn a trial with spe-

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cific remedies in suitable cases. Most of the authors mentioned prefer a thorough but carefully graded inunction cure with unguentum hydrargyri combined with warm baths, or sulphur, or salt water baths; following this up by a moderate but long-continued use of the iodides and the galvanic current; climatic and hydriatic cures constituting the therapeutic finale.

In comparing the results of treatment of cases of syphilis I had in the first ten years of my practice with those of the last ten years, I find them to be better in the latter than the former period. Not only was the time required to make the syphilis latent shorter, but the relapses were less frequent and less severe, and easily manageable. I attribute the better success in the last ten years to my discarding giving mercury or the protoiodide of mercury by the mouth, but using the inunction cure according to Sigmund's method, and as I have seen it practiced by the best physicians in Aachen, in Germany, and by those in our own country, at Hot Springs, Ark. I venture to predict that any one who will follow this method of treating fresh cases of constitutional syphilis systematically and without regard to the patient's whimsical objections to the troublesome cure he has to undergo, will have the satisfaction of effecting a quicker, better, and more permanent cure than by following the other method of dosing the patient with mercury or protoiodide of mercury.

That there are syphilitic patients who will not bear mercurial treatment in as much as they are afflicted with scrofulous or other diathesis, or others who show such an idiosyncrasy to mercury, that they will get stomatitis and salivation at the very commencement of mercurial treatment, is quite certain, but their number is small indeed. I have also met with a few cases which I could ply with mercury by the mouth or by the skin to any reasonable extent without healing the syphilitic lesions, nor could I see any of the constitutional effects of the drug in them. Wherever I cannot order the inunction cure, or do not succeed in curing the lesions with it, I prescribe the corrosive sublimate in one

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twentieth grain doses, or a course of Zittmann's decoction of herbs followed by the iodides, or a mixture of hydrarg. bichlorat. with potass. iodid.

Not unfrequently we meet in old cases of syphilis with sudden alarming symptoms from the central nervous system. It would be fatal here to lose time by instituting some slow plan of cure, while large doses of the iodide promptly given and often repeated will generally be found of eminent service.

Conclusions.—1. There is not sufficient evidence to show that syphilis may be the direct cause of the typical form of locomotor ataxia, i.e., posterior sclerosis of the cord.

2. There is proof, and plenty of it, that syphilis produces a predisposition to tabes, and is apt to make certain lesions in the cord and its meninges as readily, if not as frequently, as in the brain; lesions which may be, and often are, followed by symptoms of tabes, and are generally relieved by prompt and energetic specific treatment, but rarely cured.

3. Experience has shown me that the determination of the syphilitic virus toward producing lesions in the nerve centres will occur the sooner the less its action is interfered with by judicious and prolonged treatment of the constitutional disorder, although old cases of syphilis are, cæteris paribus, more apt to develop symptoms of neurosis than those of more recent date.

4. As it has been shown by all observers that syphilitic lesions of the central nervous system once established may often be relieved, but are seldom cured, by specific treatment, we have, therefore, additional reasons to insist upon timely and continued treatment, and to impart such information of the nature of the disease to the patient as will lead him to keep a strict and judicious watch over himself, and have suspicious symptoms attended to as early as possible,

5. I believe a properly graded inunction cure with unguentum hydrargyri in most cases of syphilis to be the best means to reduce the disease to early and harmless latency.

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THE REMOVAL OF THE AFTER-BIRTH.*

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IT is now thirty years since Credé first published his views about the best way of treating the third stage of labor, and, since then, he has repeatedly returned to the same subject.†

The chief point in this method is that the placenta is not removed by traction from below, but by pressure from above. After the expulsion of the child, the accoucheur lays the whole hand gently on the region of the womb, and makes slight friction on as large a surface of the uterus as possible. When this organ is felt to contract, he seizes it with one or, preferably, both hands, spreading out the fingers over the posterior surface, and placing the thumbs in front, and when the contraction reaches its maximum, he presses the whole organ in the direction of the concavity of the sacrum. To press on the uterus when it is not contracted is a fault and has not the desired effect. An attempt is made to utilize the first after-pain for the expression; but, in most cases, the placenta does not come away before the third, or even the fourth. Each time, the same pressure is exercised on

* Read before the New York Academy of Medicine.

† Klinische Vorträge über Geburtshülfe, 1853, pp 518–602. Bericht über die Versammlung deutscher Naturforscher und Aerzte in Königsberg im Jahre 1860, in the Monatsschrift für Geburtskunde, vol. xvi., pp. 337–342 and 345. *De optima in partu naturali placentam amovendi ratione*, Programma, Lipsiæ, 1860. Ueber, die zweckmässigste Methode der Entfernung der Nachgeburt; Monatsschrift für Geburtskunde, 1861, vol. xvii., p. 274, and Archiv für Gynäkologie, 1881, vol. xvii,, pp. 260–280.

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the uterus during the contraction, and, in the interval, the hand is kept on the womb, and if the contractions do not follow quick enough, it is used for rubbing that organ gently.

Some German authors* have of late years pretended that this method gives rise to several undesirable conditions, especially the retention of the membranes, or part of the placenta, hemorrhage, nay, even puerperal fever.

Having been taught in younger years the old way of pulling on the cord in order to remove the secundines, I can testify to the great advantages presented by the modern method of squeezing them out by pressure on the uterus. I have practiced this method during the last eight years; I introduced it in the Maternity Hospital as soon as I entered on duty there, and it has given perfect satisfaction. During my last two terms of service as visiting surgeon, the house surgeons (Drs. S. Pierson, F. K. Priest, R. Waldo, H. A. Leipziger, D. Pease, and A. Y. P. Garnett) have, at my request kept a very exact record of everything bearing on this question. Four hundred and eight women were delivered. Two of them aborted respectively in the fifth and sixth month of utero-gestation, and the adherent placenta was in both cases removed piece-meal by myself, by means of a large dull wire curette and forceps. Among the remaining four hundred and six women delivered more or less at full term, there were six cases of retained placenta. In other words, in four hundred cases the placenta was expressed by Credé's method, and in six only—that is, one and one-half per cent. of all—the method failed.

CASE I.—*Adherent Placenta.* (Accoucheur: Dr. Samuel Pierson.) Ellen C., æt. thirty-nine, married, delivered October 19th, 1882. It was a premature delivery, the utero-gestation having lasted about eight months. The labor was normal up to the third stage. Credé's method was used to no avail. At the end of one hour and three-quarters, the placenta was removed by means of the hand in the uterus. A part of the

* Dohrn, in Deutsche Med. Wochenschr., 1880, No. 41; ibidem, 1883, No. 39; Runge, ibid., No. 44; Schultze, ibid., Nos. 51–52, Kabierske, Centralbl. f. Gyn., 1881, vol. v., p. 145; Ahlfeld: Berichte und Arbeiten aus der geburtshülflich-gynäkologischen Klinik zu Giessen, 1881–82.

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placenta was protruding through the os, and, on following the cord up, the remaining part was found attached at the fundus, whence it was with great difficulty dissected off. After removal, the placenta was found to be small, very thin, flabby, and made up of two distinct parts joined by an intervening part of the membranes. Recovered.

CASE II.—*Adherent Placenta. Ante-partum hemorrhage.* (Accoucheur: Dr. S. Pierson.) Nellie S., æt. twenty-four, single, second pregnancy. She gave a history of three or four slight hemorrhages during her pregnancy. On October 22nd, 1882, she had a severe hemorrhage by which she lost fully sixteen ounces of blood, and which was only checked by tamponade. In the afternoon of the same day, she was delivered of a still-born male child weighing eight pounds and six ounces. The uterus contracted very poorly. There were no after-pains. Pulse 150; respiration 50. The placenta having failed to come away, the doctor at the end of one hour and a half, introduced his hand and dissected it off from the uterine wall, to which it was very intimately adherent. At the time of its removal it had a distinct odor of decomposition. She died of exhaustion on the same day.

CASE III.—*Adherent Placenta.* (Accoucheur: Dr. S. Pierson.) Mary R., æt. thirty-five. Fifth pregnancy. Breech presentation. Very large child. The placenta failed to come off despite the use of Credé's method. At the end of two hours, Dr. P. introduced with great difficulty his hand into the uterus. The placenta was found intimately adherent to the right corner, whence it was dissected off with great difficulty, and at length it was delivered very much mutilated. The uterus was then washed out with two-per-cent. hot carbolized water. Her condition was very bad, but she rallied quite well under the use of hot bottles, stimulants, and morphia. The next day when I saw her, her condition was comparatively good. As it was uncertain if all had been removed, I had her etherized and introduced the hand up to the fundus, but found the walls entirely smooth. She had a slight parametritis, and made an excellent recovery.

CASE IV.—*Retained Placenta. Post-partum hemorrhage.* (Accoucheur: Dr. H. A. Leipziger.) Josephine S., primipara, delivered November 30th, 1883. Repeated efforts by Credé's method having failed, and the patient being anemic and losing considerable blood from oozing and the expulsion of clots, the hand was introduced into the uterus, and the edges of the placenta found at one and one half inches above the ex-

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ternal os. It was delivered one hour and ten minutes after the birth of the child, and a hot intrauterine douche of bichloride of mercury solution (1 : 2,000) was given. After that no trouble.

CASE V.—*Precipitate labor. Post-partum hemorrhage. Retained placenta.* (Accoucheur: Dr. Leipziger.) Margaret G. Tenth pregnancy. Delivered, November 5th, 1883. Child born precipitately while patient was at stool. She lost considerable blood by expulsion of clots and a gush of fluid blood. Placenta not coming off by pressure, two fingers were introduced into the uterus and the placenta removed. Patient remained weak and pallid for some time, but otherwise the convalescence was normal.

CASE VI.—*Adherent Placenta.* (Accoucheur: Dr. D. Pease.) Regina G. Third pregnancy, Delivered December 18th, 1883. Pains stopped. Easy low forceps delivery. It was not possible to excite uterine contraction by Credé's method, wherefore the hand was introduced into the uterus one hour and fifteen minutes after the delivery of the child, and the placenta, which adhered to the posterior, wall, separated with considerable difficulty. Intrauterine injection of bichloride of mercury (1 : 2,000). Normal lying-in period.

In four of these cases, there existed an abnormally intimate connection between the placenta and the uterus, so that it may be taken for granted that no amount of pulling on the cord would have brought the after-birth away. These cases of true adhesion of the placenta are of rare occurrence, and the supposed frequency of retained placenta is probably in most cases due to improper maneuvres or undue haste on the part of the accoucheur. By the use of the method recommended in this paper, the frequency of such cases will dwindle down to a small fraction. In two cases only out of four hundred, or in one-half per cent., Credé's method failed to bring the placenta out, although it was not adherent, but merely retained.

In six cases, or one and a half per cent., more or less large shreds of membranes were retained. In one of them the whole hand was introduced into the uterus, in order to remove them; in the other five cases the introduction of the index and middle fingers sufficed for this purpose, and no trouble was observed in consequence of this procedure.

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Credé * says that he has not seen any bad consequences of leaving the membranes in the uterus, and that the introduction of the hand for their removal might cause infection. He advises, therefore, to leave them alone. Having myself seen very serious post-partum hemorrhage occur in such cases, which was checked as soon as the uterus was emptied, I have made it a rule for myself and my pupils to remove retained parts of the after-birth in all cases. By thoroughly disinfecting the hand, and following the removal of the membranes up by an intrauterine antiseptic injection, I have never seen any bad results, and I take the danger of infection under these circumstances to be smaller than that of hemorrhage and infection by leaving parts of the secundines behind. Formerly we used carbolic acid, a five-per-cent. solution for the hand and a two-per-cent. for the uterus, but since October 1st, 1883, when I introduced the bichloride of mercury treatment in the Maternity Hospital,† we have exclusively used the latter drug in a solution of 1 to 2,000. In no case was any part of the placenta retained.

Credé's method recommends itself by being modeled on the natural course of labor. It helps Nature by employing her own means. All it does is to increase the strength of the normal contractions of the uterus by which the placenta is expelled. In some rare cases we see this expulsion follow instantaneously after that of the child, but in the majority of cases, after the strong contractions at the end of the second stage, there is some atony of the womb. More or less long time intervenes before the placenta is thrown off; in some cases a more or less considerable amount of blood collects in the membranes, which are finally pushed out as a bag full of clots and fluid blood, and in not a few it does not come off at all. In the large majority of cases there is therefore a call for artificial help, and then Credé's method comes in as the one that, so to say, works in the spirit of Nature.

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* Arch. f. Gynäk., 1881, vol. vii., p. 278.

† Garrigues: The Prevention of Puerperal Infection, New York Medical Record, 1883, xxiv., p. 703 et seq.

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In the natural process the placenta is expelled by the contraction of the muscles of which the womb is composed. This organ forms a sac with the mouth turned downward and backward, and is only attached in its lower part. The bundles which enter in its composition may be divided into two groups, which may be called the proper and the common muscular bundles. The first form the bulk of the different layers of which the womb is composed. They accomplish only a concentric movement of the walls against one another and approximate the fundus to the mouth. The second comprise the bundles which find a fixed point of insertion on the bony parts of the pelvis. Above and in front we have the round ligaments, so-called, which during pregnancy become almost as thick as the little finger, send a thick loop up over the fundus, and are attached below to the spine of the pubis. In front and below bundles pass from the cervix on both sides of the bladder to the pubic bone.* Behind, the so-called utero-sacral ligaments run from the level of the internal os to the anterior surface of the third and fourth sacral vertebra. On both sides we find the large muscular expansions which form a great part of the broad ligaments, and starting from the edge of the uterus, insert themselves on the side walls of the pelvis.

Through the contraction of this second group of muscular bundles the uterus is drawn downward into the pelvic cavity, and at the same time tilted in such a way that the fundus moves forward, the cervix backward. This tilting is due to the co-operation of the round and the utero-sacral ligaments, while all the lower bundles probably contribute to the expansion of the internal os.

All these different movements are closely imitated by Credé's method. Through the pressure of the thumbs and the fingers, the walls of the uterus are from all sides brought nearer to one another, and thus the area covered by the placenta becomes diminished. On the other hand, the pressure on the well-contracted fundus pushes the whole organ backward and downward toward the hollow of the sacrum,

* Thévenot: Journ. Obstet., 1882. Supplement, p. 216.

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and at the same time presses the detached placenta against the inner os, mechanically helping to open it.

Besides this purely mechanical effect, the compression of the muscular bundles works in a dynamic way, by increasing the power of the natural contraction, especially that of the fundus.

By shortening the duration of the third stage of labor, and by increasing muscular contraction, Credé's method counteracts hemorrhage, both immediately during the third stage and after the end of labor. During the period referred to, we had among four hundred and eight patients only two cases of postpartum hemorrhage besides the two mentioned above (IV. and V.), in which a moderate amount of blood was lost.

CASE VII.—(Accoucheur: Dr. F. K. Priest.) Susan G., æt. twenty-three. Third pregnancy. Delivered on December 11th, 1882. Breech presentation, with the sacrum turned backward and to the right. When she had been in labor twenty-three hours, and was somewhat exhausted, a foot was brought down and a still-born male child weighing ten pounds and fifteen ounces extracted. The perineum was ruptured to the anus. The delivery of the child was followed by a profuse hemorrhage. The hand was again introduced into the uterus, and everything cleaned out. At the same time it was grasped and compressed through the abdominal wall. The uterus was washed out with hot two-per-cent. carbolized water. Besides, ergotine, brandy, and digitalis were given hypodermically. The hemorrhage stopped, and the uterus contracted well. Later she became affected with diphtheritic inflammation of the genitals and died of septicemia.

CASE VIII.—(Accoucheur: Dr. Garrigues.) Kate R., æt. twenty-three, delivered February 14th, 1883. She suffered from nephritis with uremia and purpura hemorrhagica. Her urine contained large granular casts. She had severe headache, vomited continually, and suffered very much without having any real labor pains.

A slight erythema had been noticed in the groins on the previous day. Since then it spread and changed character. The whole abdomen up to the ensiform process was the seat of a uniform rose-colored erythema which disappeared on

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pressure. But interspersed in the erythema were found purple or blue spots from the size of a pin's head to a pea, which did not change on pressure. The eruption extended three fingers' breadth down the inner surface of the thighs. It was less marked on the thorax, but became again much more pronounced on the neck, whence it even extended over the posterior surface of the body. Petechiæ were likewise found in both axillæ, on the mammæ, and on the back. In both eyes were large ecchymoses.

She was delivered, by version, of a dead child. Considerable hemorrhage following immediately after the extraction, the hand was introduced into the uterus, and the placenta removed without any difficulty. A hot intrauterine injection was given, and the hemorrhage stopped. She fainted, was revived, but died three hours later.

In both these cases, hemorrhage came on immediately after the birth of the child, before Credé's method could be practiced; both patients were exhausted, and the latter had blood extravasations all over the body. We have not had a single post-partum hemorrhage occurring after the expression of the placenta.

When properly executed, Credé's method of expressing the placenta is the best prevention of post-partum hemorrhage.

Inversion of the womb, which is favored by pulling on the cord, is powerfully counteracted by the method recommended; but it cannot be repeated too often that the womb is seized from *all* sides and over *the largest possible space*, that the pressure is chiefly exercised so as to *press wall against wall*, and that the downward pressure on the fundus must never be practiced except *when the womb is contracted.*

The fearful avulsion of the whole uterus by pulling on the cord, of which more than one case has been reported, becomes, of course, impossible, when the placenta is removed by pressure from above.

In some cases, the whole after-birth is expelled outside the genitals, but in most only the placenta itself with the larger part of the membranes are expelled. By turning the placenta, the membranes are made to form a kind of cord,

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and by gentle pulling on this, always seizing it as near up to the vulva as possible, it is easily withdrawn from the vagina without introducing the fingers into the canal. In this way the expression of the placenta becomes even a part of prophylactic antiseptic treatment.

Although I deliver the patient by the so-called London method, that is to say, in the left side position, which I think has several important advantages over the dorsal decubitus commonly used in this country, as well as on the continent of Europe, after the birth of the child, I turn her over on her back, in which position the *expression* is performed much better. The accoucheur stands in a much freer attitude, and can use both his hands on the womb, which by gravitation, sinks down in the most favorable direction for the expulsion of the placenta. Should hemorrhage supervene, the dorsal posture is likewise preferable with regard to the compression of the aorta, and intrauterine injections.

In his last communication, Credé states that in two thousand deliveries, the average duration of the third stage was only four and a half minutes. In our experience it was considerably longer, but this is easily explained when we remember that in the European clinics the same assistant occupies his place for a long time, and thereby acquires the courage and skill necessary for the early removal of the afterbirth, while in our Maternity Hospital a new house-surgeon goes on duty every two months. But in my opinion it is of subordinate importance whether the third stage is allowed to last some minutes more or less. In my own practice it occupies commonly fifteen or twenty minutes. The chief point is that the uterus all the time be prevented from undue relaxation, that very little blood be allowed to accumulate, and that the placenta be removed by pressure.

The assertion that the expression of the placenta should cause puerperal fever is effectually refuted by my experience, as well as by that of others, *e.g.*, Breisky's clinic. Since the introduction of the bichloride of mercury treat-

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ment, two hundred and sixteen women were delivered. There was only one case of puerperal fever, which was easily explained by the circumstance that the patient was delivered at the same time as another who brought forth a macerated child and a stinky placenta, and the accoucheur who had care of the latter case, had unfortunately been allowed to examine the former. Even other forms of inflammation and fever had been exceedingly rare. The details for the first three months are found in the above-mentioned article on "Prevention of Puerperal Infection," and during the next three months, a similar healthy condition prevailed in the hospital.

Credé's originality has been impugned, especially by some of his own countrymen, who assert that the same measures were recommended and practiced before him by English (Scotch and Irish) accoucheurs. I have, therefore, examined all the older authors whose works are found in the New York Hospital Library, a full score in number. Some of them (Smellie, Charles White, "Edinburgh Practice," and Gooch) recommend exclusively to remove the placenta by pulling on the cord, except when it becomes necessary to introduce the hand into the uterus, and they do not mention any kind of rubbing or pressure. A second and larger class (R. W. Johnson, David Spence, Hamilton, Merriman, Samuel Bard, of New York, Thomas Denman, Blundell, Charles D. Meigs, of Philadelphia, Robert Collins, Edward Rigby, Francis H. Ramsbotham, Fleetwood Churchill, and David H. Tucker, of Philadelphia), combine pulling on the cord with rubbing or pressure on the abdominal wall and kneading of the uterus, but with them all this latter procedure is only mentioned as a help; all of them remove the placenta finally by traction on the cord or the placenta itself.

A third class, finally, is formed by Johnson, Sinclair,* and

* Johnston and Sinclair: Practical Midwifery, comprising an account of 13,748 deliveries, which occurred during a period of seven years, commencing November, 1847. London, 1858.

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Murphy,* all formerly assistant physicians in the Dublin Lying-in Hospital, who describe the mode of delivery used in that institution. They show how the uterus is "followed down" by pressure on the fundus during the delivery of the child, how the contraction is kept up after the birth of the child by never leaving the uterus out of the hand, how friction and pressure are used, and state that these measures are often sufficient to expel the placenta out of the vagina; but at the same time they speak of *putting the cord on the stretch, hooking the fingers into the rugosities formed by the umbilical vessels, and drawing on the funis.* Thus not even the so-called Dublin method comes up to Credé's, the distinctive features of the latter being, 1st, that it is used in all cases; 2d, that the uterus is grasped from all sides with both hands; 3d, that the placenta is squeezed out by a decided pressure during the uterine contraction; 4th, that the cord and placenta never are touched, except in those rare cases in which the placenta is really adherent, and has to be peeled off from the uterine wall; and 5th, that the fingers are not introduced into the genital canal after delivery, at which time the danger of infection is much greater than before the passage of the child.

The advantages of this method are, 1st, the certitude with which the aim is attained; 2d, the exact imitation of natural processes; 3d, the prevention of hemorrhage; 4th, the prevention of hour-glass contraction; 5th, the prevention of inversion; 6th, the prevention of avulsion of the cord or the uterus; and 7th the prevention of infection.

The method of expression has several modifications, for the details of which the reader is referred to Dr. Mundé's article on the "Diagnosis and Treatment of Obstetric Cases by External Manipulation" (JOURNAL OF OBSTETRICS, 1880, Vol. XII., p. 361 et. seq.).

I need not say anything about the old method of pulling on the cord, because to all the advantages claimed for Credé's method correspond disadvantages in the former.

* Edw. Wm. Murphy: Lectures on Natural and Difficult Parturition. New York, 1846.

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The third method in use, if it can so be called, is the absolute abstention from any kind of interference as practiced, *e. g.*, in Strassburg.*

In normal labors, they do not even lay their hands on the abdomen, and do not remove the placenta even if it lies entirely detached in the vagina. This method offers all the advantages and limits of an experiment. It teaches us, what otherwise we might ignore, how the third stage of labor takes place in a civilized woman lying in bed in a hospital. In a hundred cases treated in this way, the placenta twenty-four times came off within a half an hour, twenty times within the second half-hour, twenty-five times in the second hour, eleven times in the third hour, nine times in the fourth, five times in the fifth, three times in the sixth, twice in the eighth, and once in the twelfth hour. In every case, the fetal surface appeared first in the os and in the vulva. The membranes formed a bag filled with a rather large quantity of blood. The decidua formed a thick succulent membrane, which commonly was prevaded by numerous blood-vessels. Twice hour-glass contraction was observed. In one case, a decided putrid odor was perceived.

Apart from the experimental interest, I fail to see a single advantage in this method. It does not even give a correct idea of what would take place under natural circumstances. By the recumbent position in bed, the placenta is artificially prevented from coming off as early as it otherwise would. If we imagine a woman giving birth to a child lying or squatting under a tree, in the open air, it is all but sure that she would not lie for many hours on her back. After a short rest, she would be likely to get up, and the placenta, which, by uterine contraction, had been cast off from the inside of the womb, and pushed more or less completely out into the vagina, would drop out by its own weight, and draw the membranes after it.

Dr. Engelmann,† of St. Louis, in summing up his compre-

* Kabierske: Beitrag zur Frage über die Behandlung der Nachgeburts-periode, in Centralblatt für Gynäkologie, 1881, No. 7, vol. v., p. 145 et. seq.

† Geo. J. Engelmann: Massage and Expression in Primitive Obstetric Practice. AM. JOURN. OBST., 1882, vol. xv., p. 622.

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hensive study of the obstetric practice of savage people, says, "The placenta usually follows the child, bu tunless this is the case *massage and expression are Invariably resorted to.*"

Nay, even some animals seem to use similar procedures when circumstances permit. Dr. Sussdorff,* of this city, in a most interesting paper on the birth of an elephant, described how that sagacious animal, after the escape of the baby, placed her abdomen upon a short post in the ground, to which she was chained, standing almost upon her head, and grasping the post with her trunk, thus forcing the abdomen with great power against the post for about ten minutes. This is not exactly Credé's method, for the placenta was not expelled before an hour and a half after the birth of the of the little one; but, on the other hand it is certainly a recourse to an artificial means of increasing uterine contraction.

In spite of the good results obtained in the small number of cases reported by Kabierske, I do not think they in any way are sufficient to remove the apprehension of dangerous consequences of non-interference which has prompted humanity to watch and abridge the third stage of labor, and to surround it with particular precautions. As it is, we see that hour-glass contraction occurred twice in one hundred cases, while in Maternity Hospital we had none in more than four times as many cases which I have used for this paper. The risk of hemorrhage is evident, since experience on a much greater scale has proved that it occurs much oftener in those cases in which compression of the womb is not used than in those in which it is resorted to, and since emptying and compressing the uterus when hemorrhage actually sets in proves such an excellent remedy, I need hardly point out that it is dangerous to leave the detached placenta inside the genitals until it stinks. Upon the whole, in a country like this, where confinement cases, fortunately, in a large measure are in the hands of physicians, I do not think it very likely that the method should win many adherents. The accouch-

* New York Med. Jour., 1882. vol. xxxvi., p. 22 et. seq.

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eur is glad to get away from a place where he has been detained for hours. He will scarcely allow himself to be retained by some decidua cells, which experience has shown come off quite as innocently in the lochial discharge as if expelled together with the bulk of the membranes. All that is required is that he should abridge the third stage in such a way as not to expose the patient to any danger, and that is best done by Credé's method. Of the three systems now followed in different lying-in asylums, that is the one I think ought always first to be tried. In very exceptional cases, that of pulling on cord or placenta may be required, while total expectancy has many disadvantages and hardly any redeeming qualities.

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ON DUPUYTREN'S FINGER-CONTRACTION—ITS NERVOUS ORIGIN.*

By ROBERT ABBE, M.D.,

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THE one deformity of the hand which has of late most interested surgeons is known as Dupuytren's contraction of the fingers—a deformity which, till his day, had been regarded as irremediable, and which even to-day is so considered, with the vicious contractions from tendon defects, by the majority of physicians and surgeons to whom the scanty literature of the subject is unknown.

It was indeed an inspiration on the part of that surgeon, whose name will always be honored by the association, that enabled him to distinguish between this disease of the palmar aponeurosis and others that resembled it closely. It was the inspiration born of hard work in a man whose energy was never tired, and who seemed to see almost all there was in the new subject at the first discovery.

If we accept the popular idea of the palmar fascia as shown in many text-book illustrations, and spoken of by some authors, we shall conceive of it only as a fan-shaped, fibrous expansion, with its narrow point touching the annular ligament of the wrist where the tendon of the palmaris longus is inserted into it, while its expansion covers the breadth of the palm at the roots of the fingers, where each of the four bundles into which it has separated divides into two leaflets, attached to the sides of the proximal phalanx of

* Read before the New York Academy of Medicine, April 17, 1884.

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each finger. This, it is true, is the grosser part of the fascia, the glistening fibrous sheet of tissue filling the space over the flexors, the palmar arches, and the muscles. But, if we dissect with care a very lean hand, we find more that concerns us in understanding the disease now considered.

Continuous with the coarse part of the fascia alluded to is a layer or net work of the same white fibrous structure—more open, looser, and thinner—covering the outer and inner sides of the palm far beyond the lines of the flexor tendons, and presenting well-marked borders, especially in the fold between the base of the thumb and the index-finger, where it gives a clean, crescentic edge, while over the palmar surface of each finger the same delicate layer continues from its base far out over the tendons toward its tip.

At every point of the grosser and finer parts of this fascia some of the fibres are seen to come toward the surface and terminate in the skin, thus interweaving through the tangled subcutaneous cellular tissue a network which effectually prevents the skin from sliding. The gross white fibers are disposed lengthwise of the palm, but everywhere cross-fibers are seen, delicate but firm, at the web of the fingers, where they constitute the fibers of Gerdy (so called by the French), and in the fold between the thumb and the index-finger. These, as we shall soon see, are often the seat of this malady, though usually the long fibers are first affected.

With this understanding of the anatomy, let us consider the history of the disease. Though Sir Astley Cooper undoubtedly recognized it, it was an unknown disease to the profession until Dupuytren described it, in 1832, giving its clear-cut characteristics as distinguished from contraction of tendons, which to the ordinary observer it resembles, being classed with the "main-en-griffe," or claw-hand, resulting either from traumatism, from abscesses, or from nerve disturbances.

He had the good fortune to dissect a hand so affected, and but a dozen other dissections of marked cases have since been made. They all verify entirely what he found—namely that there was a tightly drawn band of fibrous tissue,

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an enlarged fasciculus of the palmar fascia, lifted far above the flexor tendons and drawing down the fingers at one or more points in the palm; that the skin was quite adherent to the band in places; that the tendon itself lay below it, in its normal position, glistening white, and unaffected by the morbid process; and that the bones and joints were entirely free from disease.

He located the disease in the fascia only, and most surgeons agree in this view, though M. Fort thinks it a general inflammation of the cellular layer of the subcutaneous tissue, and not of the aponeurosis alone, because, as he says, this contraction runs down on the fingers and is sometimes found on the thumb, while the palmar-aponeurosis tongues terminate practically at the phalanges.

Thus it is evident he shares with many the erroneous views of the narrow limits of the fascia. Eulenberg and Malgaigne have insisted that the thumb has no connection with the palmar fascia. Practically the entire palm is very rich in tissue which has for its base white fibrous tissue, and it is impossible to separate this from the simple cellular tissue.

In an excellent review of the subject, eight years ago, Dr. Post expressed the opinion that the sheaths of the tendons were also involved in some cases.

Goyrand's dissections proved that they were sometimes involved at the root of the fingers when the fascia draped over the tendon beyond the arch of exit. The tendon itself in these cases is still healthy, though tied down by external fibers.

Contrary to Dupuytren, Goyrand held the new bridles to be entirely new tissue. It is a matter of little importance, as the microscopical structure, according to Richer (the only observer), shows it to be simply hyperplasia of the white fibrous tissue.

The true "Dupuytren contraction" rarely appears before middle life. This observation, noted by all writers on the subject, is verified by the admirable paper by Dr. W. W. Keen, of Philadelphia, published two years since, in which

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he reports a collection of 105 cases from every possible source, and finds the average time of development is at forty years. It is rare in women—not oftener than one case in five or six.

From a clinical point of view, the cases present themselves about as follows: The sufferer, otherwise in good health, notices a slight hardness of the palm of one hand—either a small kernel, like a split pea, fixed beneath the skin at the centre of the middle transverse crease, or else a hard cord, at the same site, in the line of the tendon of the ring-finger. It is usually painless, and perhaps for years scarcely excites curiosity until the ring-finger or little finger, as the case may be, resists being straightened out with the others.

Several nodes and bands may show themselves, or there may be only one from first to last. The band can early be felt beneath the skin before it can be seen. Then in time it forms a ridge, and finally, after progressing and shortening for from two to twenty years, it appears like a tight string to a bow, extending from near the wrist to the proximal joint of the finger, which it draws over until it approaches the palm. The skin is lifted from a quarter to half an inch from its former level, adheres to the band in parts, is puckered and wrinkled, and dimpled where fibers of attachment hold it back against the drawing tendency of the band toward the wrist.

It is with great difficulty at first that one can conceive himself that this is not a tendon below the skin; indeed, Mr. Adams, who has given our best English *résumé* upon the subject, says he cut at first many times, believing he was cutting tendons. I have been asked by one of our most eminent surgeons, while my knife was just ready to cut the band, "if I was *really* sure I was not cutting the flexors."

Three convincing proofs are these: The flexor tendons are bound down at the metacarpo-phalangeal articulations by such arched fibrous sheaths as *can not* stretch to allow them to rise from their beds, while it is exactly at this point that the fascial bands are most prominent, and certainly

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rise from half to three quarters of an inch above the tendons.

Secondly, the tense cords are not always in the line of the tendons, sometimes lying between instead of over them, and forking at the web of the fingers by the tightening of the fibers of Gerdy, so as to take firm grip on the neighboring sides of the two fingers, while in some cases rigid cords appear on the thumb or in the web between it and the index, entirely out of the course of any tendon.

Thirdly, when the bands have been divided and the fingers stretched, the patient has the power at once to put the flexors in action and close a tight fist. Could he do this if the tendon had been cut?

The malady affects, by choice, the ring and little fingers of either hand. In Keen's collection of 105 cases, the ring-finger suffered in 88, the little in 77, the middle in 45, the index in 13, the thumb in 9.

Within from six months to a year or two, however, after the first hand is seized, the opposite one is affected in a large majority of cases; and by preference the malady fixes itself on the corresponding part.

Throughout the literature of the subject I find little reference to the associated pains, and, though I am aware that many cases are without it, there are many where it is an important symptom.

CASE I.—In the first case that came under my notice, in 1881, the successful termination of which I reported in the "Illustrated Quarterly of Medicine and Surgery," in 1882, there had been contraction of the left little finger for seven years, and of the right ring-finger for one year. The latter had given the patient increasing pain for a few months before I saw him, so that he was obliged to give up work, and, as I then reported (and repeat here, as it illustrates a point in the theory of the ætiology of the disease), "for two months this band in the right palm had been so constantly in pain that he could not move this hand up to touch his head without almost unbearable suffering, and at times, especially if the palm was struck, it was much worse." (See Fig. 1.)

As the left finger had shown prior trouble and was drawn

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most into the palm, I operated on it two weeks before the other by subcutaneous sections. To the patient's great surprise and my own, the right hand ceased to be painful immediately after the operation on the left, and he found on the following day that he had been able to lie at night with his right hand behind his head and sleep on it without pain, which he had been unable to do for many months. He could also swing his hand over his head, brush his hair with it, and do various things that for months past would have caused

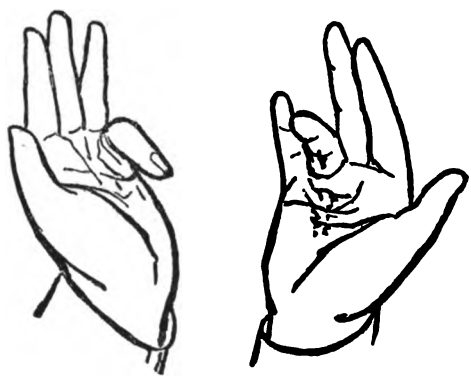

FIG. 1.

him great suffering; and yet this hand had not been touched. I shall refer again to this case after speaking of others. It is sufficient to say, I subsequently operated on the right stiff finger also, and the patient remained perfectly cured and resumed his work as a cloth-cutter six months afterward.

I will ask you to follow me now in three more well-marked cases, and then speak of some others in a group.

CASE II.—G. C. H., aged fifty-eight, a cloth-cutter, showed Dupuytren's contraction of both hands, with other extraordinary symptoms.

He had been a cutter for twenty years. Fifteen years ago he first noticed contraction of the left ring-finger, and thought it had come because he helped squeeze the large shears with this hand in cutting very thick cloths.

The contraction steadily increased, but was painless at first. Very soon afterward the right ring-finger began to draw up, and about the same time he began to have pain in the back, below the loins, which has grown worse for fifteen years.

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He continued to work till three years ago, when his lame back and contracted finger prevented it.

One year before I saw him he applied to Dr. Seguin for the distress in his back, the fingers being a very secondary matter. Dr. Seguin gave him medicines and applied various counter-irritants to his back, even making repeated cauterizations with the actual cautery. He then tried packing his dorsal spine with ice-bags, keeping him recumbent for a fortnight, believing there was a spinal lesion, probably a pachymeningitis. It gave no relief. Electricity, static and galvanic, was then applied by Dr. Gibney. Continued faithfully for a long time, this gave a little relief to the back pain.

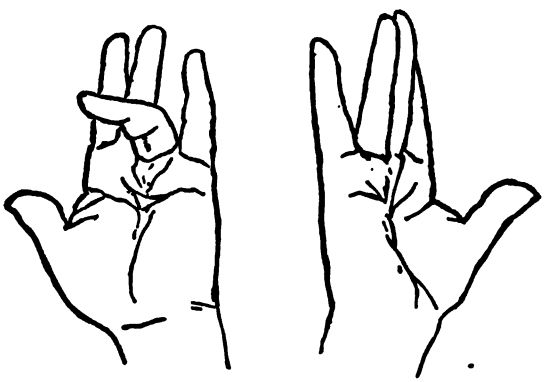

FIG. 2.

The case seemed intractable,and Dr. Seguin and Dr. Gibney referred the patient to me, in view of the case I had published, to see if I thought the contracted fingers were a factor in the nervous disturbance. I had little doubt it was so.

On examination I found his worst complaint was of the rhachialgia. He complained of great pain, as of subacute rheumatism, in the lumbar and two or three lower dorsal vertebræ, most marked on rising from a seat or on attempting to stoop. To use his own words, "he could not pick up a thousand-dollar bill if it was on the floor before him, because of the pain and stiffness." Every motion he made bore witness to the truth of his statements. He had never had rheumatism or gout, nor had his father or mother.

The ring-finger of each hand was contracted, as shown in the cut (Fig. 2); the left more so than the right. On the right the middle finger was also somewhat involved. The skin was much puckered over the contracted facial band

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from the second phalanx to the upper part of the palm. The band was very distinct and unyielding.

June 24, 1882.—I operated under ether, dividing the left band by six subcutaneous cuts, and the right by four. These rectified the attitude of the fingers perfectly, and I put them on straight splints. These subcutaneous cuts healed immediately, but the patient had considerable pain in the fibrous structures about the palm and fingers, which became thickened, tender, and somewhat stiff in their new position. It was some weeks before the subacute inflammatory stiffness subsided.

Meanwhile, what about his back? Even so soon as a day or two after the operation he spoke of an amelioration of the pain. It improved daily until, on July 4th—the tenth day—he expressed the greatest delight and surprise that his back hurt him but little, and he could now "stoop and pick up that thousand-dollar bill, or anything else." I tried him with a small object, and he could stoop freely.

For two years he had not been able to dress himself on account of the pain, and now, on the tenth day, he said, except I had his fingers on splints, he could dress himself.

I have watched him for nearly two years. In fact, he has haunted me fortnightly at my clinics and office, to express his gratitude and show his continued health.

All pain entirely left him, and has never returned. The fingers were somewhat rigid as regards complete flexion for nearly a year, but have been perfectly restored, and he can shut them tightly down into the palm.

CASE III.—L. H., aged fifty-seven, a Boston gentleman, was kindly referred to me by Dr. Fordyce Barker for double Dupuytren contraction. His mother had some contraction of the fingers, coming on after the age of fifty years, for which, he remembers, she used to sleep with a rubber ball in her hand to prevent further contraction. She also had some trouble in one knee, which became stiff in a flexed position. She had never had gout in her feet.

The patient's father never had gout or rhematism. Nine years ago there began a contraction of his palms, first in the right hand, involving the ring and middle fingers, very soon after of the left also. It was usually without pain. The left ring finger gradually drew down, until three years ago its tip touched the palm. Two years ago Dr. Twitchell, of Keene, N. H., made one subcutaneous cut of the band in the palm and released it partially, so that it stood as now shown (Fig. 3), and it had since kept all that was first gained.

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The right hand had slowly progressed until every finger was involved as follows:

One sharp crescentic band stretched tightly in the web between the thumb and the index finger from base to base, with a spur running up on the first joint of the thumb. This held the thumb rigidly in toward the palm. Another band, inserted into the skin near the second joint of the index, followed up the palm in the line of the flexor tendon, to the thenar eminence, with a spur into the center of the palm. A solid band extended from the base of the second phalanx of the middle and ring fingers straight up the center of the palm nearly to the annular ligament, and one ran from the palm to the little finger.

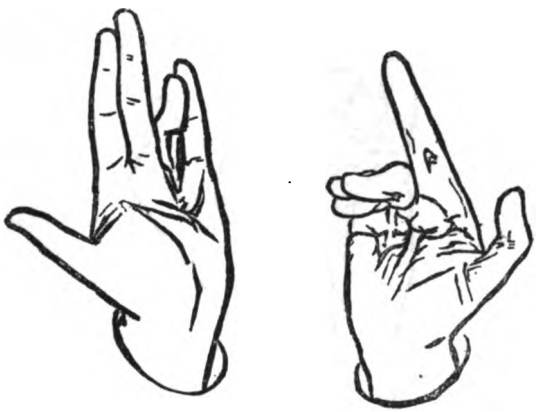

FIG. 3.

On the left hand one rigid band stretched to the ring-finger, and one between the bases of the thumb and the index.

The deformity was very great, and, besides, there had been several times yearly an attack of painful subacute swelling of these fingers, especially at the joints, keeping him awake nights, and relieved by no anti-rheumatic remedy except the French preparation of Dr. Laville.

The patient had therefore come to brood over the discomfort and unsightly appearance, and was giving up his favorite pastimes of driving, whist, and Shakespearean recitations. He could not sweep in a trick of cards, grasp a goblet of water, put on a glove, etc., and insensibly it had produced a decided impression on his spirits.

On February 26, 1883, I operated under ether on his worst

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hand only. The bands were all cut at points of tension, beginning nearest the wrist, and repeated until the fingers were released. Adhesions to the skin and deeper parts prevented any one cut from doing all the good, so that when all the bands were released I found I had made twenty-five subcutaneous cuts. (See Fig. 4.) The hand was dressed antiseptically and invested with plaster of Paris, all the fingers being extended. The patient began to come out of the anæsthesia before I had dressed the hand, and involuntarily closed his fist with the greatest tightness, showing the flexors to have been untouched by the cutting.

FIG. 4.—The right hand of the patient whose hands are shown in Fig. 3. The dotted lines indicate the contracted fascial bands, and the heavy cross-lines the twenty-five subcutaneous sections.

The local pain from the unwonted extension was severe for two days, but lessened gradually until the tenth day, when an increase suddenly took place resembling subacute rheumatism of the various knuckles. He took colchicum and iodide of potassium, and his favorite "Laville," but without benefit. One or two fingers had to be released from all restraint before it was endurable, the patient having tossed in bed several nights in spite of morphine in moderate quantities.

The cuts all healed at once, but a firm, resisting state of the whole fascia investing the hand ensued, with œdema, joint swelling, and pain, but no cellulitis or dermatitis. Sedative lotions and anointing gave him ease. Brief immer-

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sion in hot water made them temporarily more supple, and was repeated several times daily. The splints were lightly bound on at intervals.

It was two weeks before the hands began to quiet down. The fingers retained a somewhat stiff, fibrous investment, which prevented flexion at first, but by degrees this has disappeared and excellent flexion has resulted.

It is now a year and two months since, and the patient has kept every particle of extension gained by the sections, with an almost complete return of the power of flexion. He is able to make a fist, bringing the tips of all but the little finger into the palm by voluntary effort.

The joint of the little finger had been so surrounded by old dense fibers that I preferred not to cut deep among the tendons, so it was but half released. But now the slight flexion looks more natural than a straight little finger.

Quite as important as the local change is the fact volunteered by the patient's wife, and corroborated by him, that he has not been so well in general for many years as since the hand was released.

There has been a gain in flesh, his nerves are quiet, his mind is serene, he sleeps well at night, and never has pain in the hands.

CASE IV.—F. S., a gentleman of sixty years, whom Dr. James Knight very kindly referred to me with contracted little and ring-fingers of each hand. Fifteen years ago he sustained a slight cutaneous laceration at the middle flexion-crease of the right little finger while helping to carry a trunk. Within two months a slight bunchy swelling just above it and a little drawing of the finger were noticed. Dr. Sayre, the patient said, had tried to straighten it by a posterior splint and rubber band, without benefit. Within the next year the little finger of the opposite hand took on the same action at the same point, and the ring-finger of the right hand also, but not until five years later did the ring-finger of the left hand take on its contraction. (See Fig 5.)

In 1871, 1874, and 1876 the bands were divided subcutaneously at one or two points each by Dr. Hammond and Dr. Stephen Smith, but no splints were used and recontraction took place.

There has never been pain in the parts. The patient

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neither inherits nor has acquired rheumatism, gout, or other taint. Each hand presents a dense subcutaneous band in the palm, running from near the wrist to the neighboring sides of the ring and little fingers, very symmetrical, though the left one draws down most. No amount of pulling can extend them farther.

February 1, 1884.—I divided the bands by Adams's subcutaneous method in each hand, the patient being etherized. On cutting the bands one can appreciate that, although so much like a tendon in appearance, it is a tense, ribbon-like band, that the point of the knife quickly cuts through. I always prefer passing the knife between the skin and the fascia and cutting downward.

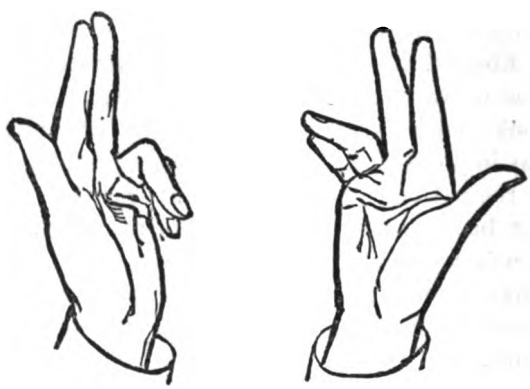

FIG. 5.

At the web of the fingers the cross-fibers bound the fingers rigidly together, but yielded beautifully to subcutaneous cuts, letting the fingers gape widely apart. After the bands disappeared two of the joints were found to have a moderate extra-capsular fibrous thickening, and had to be forcibly extended. Twenty cuts were necessary in each palm. The hand was dressed antiseptically, and rigidly extended on posterior splints.

He suffered acute pain for many hours after on account of the severe stretching, but was easy directly I released the fingers. I continued pretty full extension, however, for a week, during which time there ensued the same condition I had seen in each of the other cases—to wit, a general hyperæmia of the deeper tissues, especially about all the knuckles of the hand; a firmness of the aponeurotic layers, and puffiness and tenderness of the joints, all going to make up a close resemblance to subacute rheumatism.

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I believe this to be solely due to nerve irritation, and not, as supposed by other observers, to be an attack of rheumatism.

After two weeks the patient used his splints only at night, and two weeks later only at intervals of two days.

It is now eleven weeks since the operation, and this much has been accomplished: The two ring-fingers can be extended by voluntary effort perfectly straight, and one can be already flexed so as to nearly touch the tip to the palm. The other only flexes to a right angle with the palm. The little fingers flex and extend imperfectly, but all are gaining, and, when the dorsal fascia softens enough to give the flexors a chance to bring the fingers over, they will do their part.

The trouble following operation is not in the flexors, but in the fibrous tissues generally.

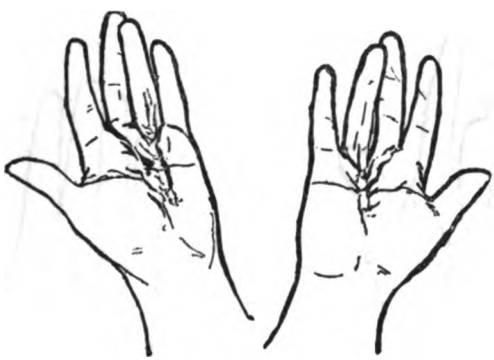

FIG. 6.

I present now briefly a group of seven other cases:

CASE V.—A retired physician, aged sixty-one, with no acquired or hereditary gout or rheumatism, and no traumatism that he remembers, began to have a contracting band in the right palm one year ago—which had been preceded by occasional pain in the same site for three or four years—with numbness and tingling, which latter abated when the band contracted, but the stitches of neuralgic pain would occasionally run up the forearm and arm. (See Fig. 6.) As his home was in a malarious section, he took quinine at the time and relieved his pain. But six months ago the left-hand ring-finger began to contract, and all the pain is now in that. The malady is progressing in that hand worse than in the other. He desires me to operate on him soon.

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CASE VI.—W. H., a girl of seventeen. Has had since childhood a natural semi-contraction of each little finger, which she attributes to the habit of carrying a milk-pail on her finger-tips, as she says a good many of the girls do in Germany and acquire the same. One year ago the right ring-finger inflamed over the back of the second joint, implicating the extensor tendon, and matter was let out. The joint was not involved, but on the palmar surface a band began to form, and has rapidly drawn down the finger until its tip lies in the palm. (See Fig 7.) Without ether, I cut the band subcutaneously at two points over the palmar aspect of the proximal phalanx, released the finger, and nearly straightened it. Three months later there was fair power of flexion, without recontraction, and the patient was greatly pleased.

FIG. 7.

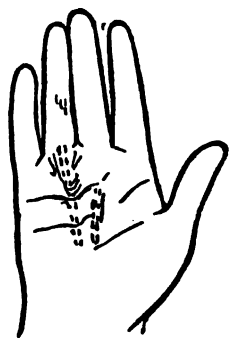

FIG. 8.

CASE VII.—A man, aged thirty-five, had never had rheumatism, though his father occasionally had it in his knees in bad weather. Four months ago he had a sprain of the right wrist, caused by shoving a case of goods. The usual periarthritis of sprains encircled the wrist and involved the palmar aponeurosis. The little finger drew down two months ago at a right angle so tightly that no stretching could extend it, showing a rigid band on the palmar surface and a lateral thickening. I divided the cord subcutaneously, and the outside lateral band, and brought the finger nearly to complete extension.

I watched him for some time, and the flexion power returned as fast as the improved condition following the sprain would allow.

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CASE VIII.—Catherine S., aged sixty-five, with no hereditary or acquired rheumatism. Contraction of the palm of the left hand began two years since, with the formation of ridges and dents in the palm, without pain. Since then a ridge has formed along the course of the little-finger tendons, and cords can be felt, but are not conspicuous, along the middle and ring fingers and the thumb, also between the bases of the index and the thumb.

There has been a burning sensation in the palm, but no neuralgia.

The right hand became affected just after the left, but the contraction only involves the fascia going to the ring and little fingers.

CASE IX.—Daniel C., aged fifty-two, a butcher. Four years ago he began to have puckering of the right palm over the ring-finger tendon. For two years there had been a tingling sensation in the little-finger and the adjacent side of the ring-finger tendons, but no neuralgia. During the four years, however, there has been a sort of writer's cramp of the thumb and the little and ring-fingers of that hand. After attempting to write for a few moments, they stiffen up and get so cramped that he has to drop his pen and pull them straight. It only comes on in writing or prolonged grasping, and never comes elsewhere. The ring and middle fingers now have palmar cords and puckered skin. (See Fig. 8.) He never had rheumatism. He can assign no cause for the trouble, and, as it does not disable him from his duty of watchman, he refuses an operation.

CASE X.—Mr. F. B., aged sixty-one. His father had gout in his foot frequently during the latter part of his life, and his sister has enlarged rheumatic joints. One brother has a drawing down of the little finger. dating from two years ago.

The patient never had rheumatism, but has had the following interesting form of neuralgia: For three or four years he has had numerous attacks of pain lasting ten days or so, extending from the vertebra prominens down each shoulder and each side of the neck to the elbow, relieved by folding the arms tightly and squeezing them, or by pressing on the shoulder.

Again, every month or six weeks for the past three or four years, the intervals being longer in summer, he has had attacks of sudden neuralgia in the right palm, repeated every few minutes for several hours, generally at night, eased

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only by pressing the sound thumb into the affected palm. The pains have somewhat the character of those of locomotor ataxia. They have never occurred except in the right palm, and have not been dependent on indigestion, the weather, or other apparent cause.

Again, for two years past he has had occasional neuralgia at three points in the right leg and thigh, sharp at first, but disappearing in from three to six hours, recurring in two or three months, usually at night; and, lastly, he has for five years had hyperæsthesia of the back, so that after a bath, if one should rub his back with a towel, it would give him severe pain, while pressure gave none.

His spine is not tender; his nutrition is fair; and there is no evidence of locomotor ataxia.

He was treated in 1865, by the late Dr. Van Buren, for secondary syphilis, but has never had a sign of it since.

His right hand shows two dense contracting bands of the ring and little fingers, drawing them over somewhat, and existing from six to seven years. The left has three contracted bands—to the ring, little, and middle fingers—in the palm, well marked, but not flexing the fingers.

He is able to support himself by light work, and will not take time for treatment at present.

To what conclusion does the study of these cases bring us?

One will notice, first of all, a decided prominence of nervous manifestations in the majority of these cases resembling spinal reflex action, and I will venture to assume the following working hypothesis as capable of explaining fully the symptoms observed in this disease:

First, A slight traumatism, often entirely forgotten.

Second, A spinal impression produced by this peripheral irritation.

Third, A reflex influence to the part originally hurt, producing insensible hyperæmia, nutritive tissue disturbances, and new growth, shown in the contracting bands of fascia and occasional joint lesions resembling subacute rheumatism.

Fourth, Through the tense contractions, a secondary series of reflex symptoms, neuralgias, general systemic disturbance, and a reflection of the trouble to the corresponding part of the opposite hand.

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If we can prove these, it will give, to my mind, an agreeable substitute for the now commonly accepted theory of gout, a blood disorder, as a cause.

The disposition of the profession is to regard any joint inflammation of an acute or subacute form as of rheumatic or gouty character—a sudden accession of lactic acid, uric acid, or other chemical irritant. I desire to call attention to the nerve theory of acute rhematism set forth by Dr. J. K. Mitchell, of Philadelphia, in 1831 and 1833, and afterward elaborated by Froriep and Canstatt, which had for its basis a valuable series of observations on such cases as sudden seizure with articular rheumatism in patients with partial paralysis from spinal injuries, Pott's disease with irritation of nerve roots, hemiplegia with central irritation, and finally a great number of acute rheumatism cases magically relieved by spinal counter-irritation, and depletion over the cervical or dorsal region, according to the limbs affected. This was the basis for the theory, now accepted, of hemiplegic arthropathies and those sometimes seen in myelitis and spinal tumors, and finally, the more chronic forms of joint disease of locomotor ataxia.

S. Weir Mitchell says the local peculiarities of spinal arthropathies will not enable the most acute observer to distinguish them from ordinary types of rheumatism, while Charcot says the only clinical characteristic distinguishing them from common rheumatism of the joints is their limitation to the joints of the parts affected with palsy. Mitchell, again says, that wounds or any form of nerve lesions can produce, apparently, acute articular rheumatism.

With this new light, we must take exception to that point in the argument for the gouty origin of Dupuytren's contraction, that rheumatic attacks set in sometimes after the operation for its relief. As my Cases II, III, and IV show, the rheumatism depended on the peripheral irritation of the cutting, stretching, and forced extension, while the preceding attacks had been caused by the presence of the tight contracted palmar band.

Again, Brown-Séquard says: "The peripheric signs of

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nerve irritation include contraction of muscles, referred sensations, pain, burning formication, etc., and altered blood supply."

You will remember that in Case IX the patient had marked writer's cramp, with tingling sensations, during the four years of the contracted fascia. In Case VII there was a burning sensation in the palm. In Cases I, II, III, V, and X, there was most important and aggravated neuralgic symptoms. Whether these were due to peripheric irritation of nerve filaments secondarily involved in the contraction, or to a central disturbance consequent thereon, each may judge for himself. But what can we say for the extraordinary relief from the rhachialgia and cervico-brachial neuralgia in Cases I and II, that had defied the most skillful treatment, but yielded at once to the removal of the peripheral cause when the bands were cut? Or the improvement in health and entire relief from articular rheumatism in the hands in Case III, during a year and a quarter since the operation?

There is in my mind little doubt that the local contraction is responsible for many of the symptoms which have been attributed to a gouty origin. But it will be said by the defenders of the theory, Why does it so often happen that no traumatism can be assigned to start the trouble? I would call attention, *per contra*, to the cases in which it does happen, as in the typical Case No. IV, where a cutaneous laceration preceded the contraction, and in Case VII, where an athritic sprain caused it, as well as in the very first recorded case, that of Dupuytren's wine merchant whose strained palm was the cause, and in a good proportion of other cases reported. We are always liable to receive pricking, violence, and over-straining here, and it may be only on the thousandth occasion that the nerve filament will be involved which will set up this trouble—just as tetanus follows in only a small proportion of nerve lesions.

Finally, the argument that the symmetry of the affection (so well shown in Case IV, V, and others, where absolutely the same parts of each hand were contracted) goes far to

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prove a gouty or blood disorder loses most of its weight when we draw attention to the frequent cases of sympathetic ophthalmia. An eye that has been injured or operated on in the ciliary region is quite likely to be followed by destructive inflammation, beginning in exactly the same situation in the well eye.

Ophthalmologists agree in attributing to the ciliary nerves the transmission of irritation to the brain center, and thence reflecting it along the corresponding nerve to the same situation in the opposite eye. In the hand we see the "labor insults," or traumatisms by pressure and so on, occurring naturally on the little-finger aspect of the palm, the cutaneous supply of which is from the ulnar nerve, reflected in a few months to the opposite hand, usually in the same position. These minor injuries are mostly forgotten as soon as made, though their effects remain.

Regarding the frequent occurrence of a family history of gout in the subjects of this affection, Dr. Keen notes that, in one hundred and five cases which he finds recorded, mention was made of its presence or absence in only forty-eight, and of these it was said to be present in forty-two, absent in six. Certainly no such proportion as $\frac{42}{48}$ of the cases are gouty, or else the marked cases I have reported would have shown some verification of these statistics. It is probable, indeed, that in the fifty-six cases in which it is not mentioned it was mostly absent, and therefore unnoticed. Adams, whose experience entitles his opinion to the greatest weight, recently adhered to his judgment of its gouty origin in discussing the paper of Mr. Noble Smith before the Royal Medical and Chirurgical Society, while Mr. Smith, who had personally looked over some seventy patients having this affection, found the evidence was against that theory. In this opinion he was endorsed by the president of the society, Dr. George Johnson. The theory of traumatism was preferred. The seventy patients examined by him were found among seven hundred elderly people of the working classes, and included all degrees of the same trouble. Mr. Adams's *clientèle*, on the other hand,

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is among the upper classes largely, where gout is an almost universal legacy. In America, typical gout is comparatively rare, but rheumatism very common. In a word, it seems reasonable to think that, in considering any malady, be it cataract or enlarged prostate, or anything else, we should, on diligent inquiry, find a very large proportion of patients whose relatives or ancestors had been subject to rheumatism in this country or gout in England.

Mr. Noble Smith says also that "contraction of the palmaris longus was almost constantly present in his cases, and it was thought this might indicate a condition of nerve irritation." This is quite significant in view of the theory I have advanced.

The presence of sugar in the urine in some cases has recently been suggested by a French reporter as a possible cause. I have examined it in only four of my most marked cases, and find no sugar; I presume its occasional appearance may be classed with transient glycosuria, which Charcot says may come from peripheral irritation, as in burns of the surface.

The favorite method of operation is that of multiple subcutaneous incisions practiced by Adams, of London, resorting to just as many as are needed to break up the continuity of the contracted band.

Mr. Adams recently said he had been obliged to make eighteen on one hand. In Case III, I was compelled to make twenty-five before the contractions were overcome, every finger being involved, while in Case IV twenty were made in each hand.

I think the number makes little or no difference, if they are done carefully. Antiseptic dressings will protect from all danger.

From my experience, one important suggestion may be drawn. Do not keep the hand over-stretched after cutting by binding it too tightly on splints. I believe the general fascial inflammation following is due to the nerve irritation incident to this on the principle of "*ubi irritatio, ibi fluxus*," and that we should do better to keep the hand only so far extended at first as not to give pain.

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I have not resorted to the method of operating practiced by Busch, of Bonn—lifting a long V-shaped skin-flap in the palm, dissecting out the contracted bands, and allowing the wound to granulate. With antiseptic precautions it would be safe and may present advantages, but I judge, from the limited experience I have had, that Adams's method leaves nothing to be desired.

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PRACTICAL SUGGESTIONS UPON THE ALIMENTATION OF PATIENTS SUFFERING FROM DYSPHAGIA.*

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FEW expressions suggest to the mind of the experienced physician so much of extreme suffering as does the word dysphagia. To the patient, already enfeebled by irremediable constitutional disease, and requiring all the help which good nourishment can afford, this symptom comes as an overwhelming blow, which effectually crushes out all hope for life and for comfort which may remain. Again, when safety lies in the successful passage of a dangerous crisis, the want of proper sustentation will often prove disastrous, while, in cases of less apparent danger, the demoralizing effects of severe dysphagia are often most serious. We may well be impressed with the important relations which it bears toward the general well-being of the patient, and the urgent necessity which always exists for its relief.

The object of this paper will be to remind you of the morbid conditions with which dysphagia may be prominently associated; to discuss briefly its direct influence upon these conditions; to suggest for its relief some methods which have heretofore not been fully appreciated and utilized; and, finally, to urge the prompt employment of these methods in

* Read before the New York Academy of Medicine, May 15, 1884.

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all cases in which they are likely to be of service. Dysphagia may be caused by organic, by functional, or by surgical derangement of one or more of the parts concerned in deglutition. Again, these derangements may be either acute or chronic, remediable or irremediable, so that the indications to be met, and the end to be attained, cover a wide and varied field.

The *organic* derangements which most frequently cause dysphagia are: *a.* Tuberculosis; *b.* Cancer; *c.* Syphilis; *d.* Diphtheria; *e.* Tonsillitis; *f.* Parotitis; *g.* Retro-pharyngeal abscess.

The *functional* derangements are: *a.* Spasm of the pharyngeal constrictors; *b.* Paralyses.

The *surgical* conditions are: Operations upon and injuries to—*a.* The soft and hard palate and uvula; *b.* The tonsils; *c.* The pharynx; and *d.* The larynx.

In all these conditions, the act of deglutition will produce;

1. Pain, either local or reflex; or,

2. Mechanical or chemical injury to parts already inflamed or ulcerated; or it may cause both.

These, and especially the first, may, not only by interfering with the ingestion of food, but also, by the depressing effect upon the nervous system of frequently recurring shock, result in:

3. Impairment of nutrition.

The general indications to be met would therefore be:

1. The securing of rest, and avoidance of causes which excite pain.

2. Protection of the parts from mechanical or chemical injury.

3. The maintenance of nutrition.

Heretofore, the resources for meeting these indications have been crude, limited, and ineffectual. Thus, in tubercular or cancerous ulceration of the throat, the patient, unable to swallow either solid or liquid food, has been directed to bolt quickly an unbeaten raw egg, or a raw oyster, or some semi-liquid, and yet coherent bolus as should contain the greatest amount of nutriment in the least possible com-

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pass, and in this manner reduce the number of acts of deglutition to a minimum. Meanwhile, in spite of local anodynes and healing applications, pain and injury have been steadily augmented, and, in the unequal struggle for life, the patient never taking at any one time food enough to supply the demands of nature, has surely lost ground. Again, in severe acute affections of the throat, the patient will often decline to take any nourishment whatever, until the severity of the attack shall have subsided, thus adding to the enfeeblement caused by the disease itself, and protracting the period of convalescence.

In the neurotic and surgical affections before referred to, the difficulties and objections to swallowing are evident.

Since the act of deglutition is the immediate cause of dysphagia, the most rational means for relieving the dysphagia would be, obviously, to remove the cause; in other words, to abolish the act of deglutition. This, in fact, is what it is proposed to do, and by the following methods:

I. When there exist both dysphagia and inability on the part of the stomach to retain food, a most invaluable resource lies in rectal alimentation, the utility of which has been so well established that it is only necessary, in the present connection, to call attention to the importance of its adoption early in the history of the case, and before the strength of the patient has been reduced by want of food.

II. When, on the other hand, the condition of the stomach is good, then, granting the desirability of alimentation by the natural passages, the indication is clearly either to remove the obstacle to deglutition or to avoid it. The former is impossible: the latter may, in most instances, be easily accomplished by means of the method which I am about to describe. You will recognize it at once as founded upon old and well-known ideas, and as embracing but few principles with which you are not already familiar, even though you may not have put them into actual practice. The basis of the method is founded upon the stomach-tube, which, discovered by Renault, in 1802; applied twenty-five years later by Physick, of Philadelphia, as an essential part

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of the stomach-pump; advocated by Küssmaul, in 1867, as a means for washing the stomach in certain forms of dyspepsia; and, finally, utilized by Débove and Dujardin-Beaumetz in their process of forced alimentation in phthisical and badly nourished patients, has not even yet received the wide application of which it is capable.

Unlike the old practice, however, namely, that of inserting a tube of large diameter through the œsophagus and actually into the stomach, the method herein advocated has as its basis the two following principles:

1st. *The employment of a tube of the smallest possible calibre*, and

2d. *The introduction of this tube, not into the stomach, but merely into the œsophagus and past the point of obstruction, or else past the pharyngeal constrictors.*

Through the tube the stomach may be made to receive food in almost any amount and variety, and that without any attempt at deglutition, and with perfect protection to the parts. Hence, it is evident that by that simple device all of the indications mentioned above will be completely met.

1. Pain is at once done away with and a maximum of rest to the pharynx is secured.
2. Injury is avoided, and
3. Nutrition is maintained.

The apparatus needed for this purpose is exceedingly simple. The one which in my hands has been the most convenient, consists of a receiver in the form of an ordinary conical-bottomed soda-water bottle, into the mouth of which is fixed a tight-fitting India-rubber stopper. In this stopper are two perforations, through each of which passes a glass tube, one short, the other reaching to the bottom of the bottle, so that all of its contents may be exhausted without including any air. To the short tube is attached a Davidson's air-compressor, while the long one is connected with an English flexible woven catheter, of any size from 8 to 18, by means of about a yard of rubber tubing, the continuity of which is interrupted by an inch of glass tube, after the

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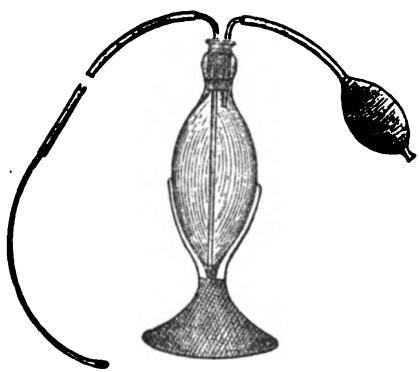
manner of the tube of the ordinary aspirator. A simpler contrivance even than this is the device of Faucher, who, instead of using an air-tight receiver, merely attaches to the end of the tube a glass funnel. An ordinary Davidson's syringe has sometimes been used.

The size of the catheter should be regulated by the age of the patient and the nature of the liquid to be introduced. It is better not to rely upon the lateral opening in the catheter, but to perforate it at its tip, so that the fluid may pass immediately and unobstructedly downward.



As to the liquids which it may be possible thus to employ, their variety is unlimited, while their consistency may be of considerable thickness and body, so that food of almost any desired class, and in any quantity, may be administered. For a full description of the preparations recommended by Débove and Dujardin-Beaumetz, I must refer you to the article upon "Lavage et Gavage," by the latter, or, better still, to the excellent paper upon the subject lately published in the *New York Medical Journal*, by Dr. Henry B. Millard, of this city. In injecting the fluid into the œsophagus it is generally necessary to proceed slowly, allowing, in an adult, not more than half an ounce to pass at once, and stopping for a few seconds before repeating the injection, so that, as far as possible, the natural physiological action may be imitated.

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To the great advantage of the catheter over the large and clumsy stomach-tube, it is scarcely necessary to refer, as its introduction is much less startling and uncomfortable to the patient, and if the preparations referred to above be used, the large tube will be unnecessary. As a general rule, the irritation caused by the passage of the tube increases with its size. The tube should be introduced in the usual manner, namely, the patient's mouth being opened and his tongue protruded, the catheter should be carried to the base of the tongue, the patient told to swallow, and, as he does so, the catheter pushed into the œsophagus, and thence downward as far as may be deemed necessary. The larynx may be avoided with certainty by using the finger as a guide. Before its introduction the tube should be carefully lubricated, for which purpose white of egg, mucilage, or even milk, are useful. An excellent plan is to allow the patient to swallow slowly, just before the introduction of the catheter, a drachm or two of pretty thick mucilage. Vaseline, glycerine, and oil are unpleasant to the patient, and should on no account be used. In passing the catheter gentleness should be used, and great care taken to avoid, as far as possible, all points of special tenderness. In many cases the patient may be taught to pass the tube himself much more successfully and comfortably than it can be done for him, since the manœuvre is not a difficult one, and no one knows so well as he the exact situation of the painful spots. Sometimes, especially with children, the point of greatest irritability is in the palatine arches, and any attempt at passing a tube across them will be followed by violent gagging. In such cases a soft rubber tube may be passed through the nostril and pharynx, and thence into the œsophagus, and thus contact with the fauces be wholly avoided. Should the introduction of the tube cause dyspnœa, direct the patient to take full breaths. It may also cause nausea when it passes the pharynx, for which Dujardin-Beaumetz advises the administration of bromide of potassium; and, also, when it reaches the stomach, in case it be inserted so far, for which the introduction of food will quickly bring relief.

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Of course, the passage of the tube will not always prove an easy or a painless operation. A little practice, however, will render it possible in nearly every instance, while the advantages to be gained far outweigh any ordinary objection to the method. No one who recalls to his memory the delicious sensation of repose and satisfaction which has, to him hungry, followed the ingestion of a hearty meal, will fail to appreciate the comfort and relief which the tortured and starving unfortunate will derive from the use of this simple means.

Turning now from the general consideration of the subject, it will be well to study more particularly the special application of the methods just described.

Organic Derangements.—a. Tuberculosis. In no disease does dysphagia play a more important part than in this. Although the resources of modern therapeutics have rendered it possible to control, to some extent, the tuberculous ulcerative processes commonly found in the larynx and pharynx, still no amount of medication can counterbalance the evil effects of the local disturbance caused by deglutition; and, even in cases in which the ulcerations are confined to the interior of the larynx, beyond the reach of matters swallowed, deglutition is apt to provoke attacks of coughing which not only cause the food already taken to be vomited, but inflict additional injury upon the parts. When the ulcerations are external to the larynx, for example, upon the epiglottis, or in the region of the tonsils, the pain is more intense than in any other lesion of the throat. Thus nutrition is almost totally arrested at a time when life is most dependent upon it. In cases in which extensive degeneration has taken place in the lungs, and this condition must soon of itself prove fatal, dysphagia stands in the same relation that it does in cancer; the symptoms can only be palliated, and with little hope of prolonging life. In many instances, however, extensive ulceration of the larynx occurs long before the pulmonary lesion has progressed beyond control. By proper conditions of climate and *nutrition*, life may be prolonged indefinitely, so far as the lungs

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are concerned. But the dysphagia interferes with nutrition; strength to cope with the disease is not forthcoming; and so, through a cycle of unfavorable influences, the progress of the patient is from bad to worse, until, finally, he succumbs from inanition. It is in such cases that the results of treatment by the tube are most brilliant, for it will readily appear that, with a full and well-assimilated diet, the conditions under which the patient labors are materially altered, and the possibilities of recovery or of improvement infinitely increased.

b. Cancer. The most unpromising circumstances under which dysphagia is likely to occur will be found in some one of the various forms of cancerous disease which may attack the throat. The extreme liability to destructive ulceration in cancer of the mucous membrane renders dysphagia an early and prominent symptom. The pain in such cases increases with great rapidity, until a time comes when the dysphagia surpasses the limit of human endurance, and when the pangs of hunger are less intolerable than is the agony caused by each attempt to satisfy it. The condition of the patient is such that the history of suffering cannot furnish a parallel. No creature can be more miserable, none more hopeless. While it may not be desirable to prolong life under such circumstances, still the performance of tracheotomy when indicated is always regarded as a duty, and with equal justice the patient should be fed, and his pain relieved, even when there is no doubt as to what will be the final result. Here, again, the tube will prove a source of greatest comfort.

c. Syphilis. As in phthisis, so in syphilis nutrition plays an all-important part in the successful treatment of the case. Although the danger to life may not be so great as in phthisis, still in extensive secondary or tertiary disease of the throat it is by no means inconsiderable, while dysphagia is often very severe. The earlier the patient can be placed upon a full supporting diet the more quickly will he be likely to respond to constitutional treatment. The importance, therefore, of overcoming dysphagia and its effects is clear.

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d. Diphtheria. In many cases of diphtheria, dysphagia is not a marked symptom. When, however, it exists, the tube should be immediately resorted to, in order that the heart's action may not be influenced by the depressing effects of pain; and, more particularly, because in this disease the question of nutrition is of such vital importance.

e. Tonsillitis. In all acute inflammatory affections of the tonsils, dysphagia is frequently so distressing that the patient will for several days refuse all food whatever. This, of course, adds to the duration and severity of the attack, and, therefore, protracts the period of convalescence. No one familiar with such cases can have failed to observe the beneficial effects of the first hearty meal which the patient is able to swallow. The inference naturally follows that nutrition should be maintained from the outset.

f. In Parotitis and (*g*) *Retro-pharyngeal abscess,* as in tonsillitis, dysphagia is frequently so distressing that the tube will be of great service.

Functional Derangements.—a. Spasm of the pharyngeal constrictors. Although this condition is rare, cases now and then occur in which the hyperæsthesia is so great that the power of swallowing is, for the time being, lost, so that, when it continues for any considerable length of time, the patient may suffer severely for want of food. A few well-assimilated meals would, from their tonic effect, probably contribute more than any other one thing toward the breaking up of the attack, as well as satisfying the immediate demands of hunger.

b. Faucial paralysis from any cause—from cerebral hemorrhage or embolism, or from diphtheria—is always a most important and annoying symptom from the well-known tendency of the food to get into the larynx. In his excellent work upon diphtheria, Prof. Jacobi suggests the value of the stomach-tube in diphtheritic paralysis.

Surgical Conditions.—As to the surgical conditions in which the tube will be of service, it is only necessary to mention them in order to suggest the great utility of the method. In all such cases it will be well to accustom the

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patient to the use of the tube *before* the operation, so that he will not be obliged to learn it under adverse circumstances.

I have dwelt thus particularly upon the details of the subject in hand, even at the risk of being prolix and elementary, because I believe that by a proper use of the methods described much distress may be done away with, and great good accomplished.

Some, doubtless, will object that the passage of the tube is likely to be disgusting, painful, or unnecessary, and that no sensitive or refined patient would submit to such a proceeding. My own experience, however, covering a period of nearly four years, and embracing a wide variety of subjects, together with the large and rapidly increasing mass of testimony both from home and from abroad, has satisfied me that the passage of the small tube is a comparatively easy matter, and that I am amply warranted in advocating the views herein advanced.

I would urge for the special method described a fair, patient, and intelligent trial in cases suitable for its employment, and am confident that, once having gained the limited amount of manipulative skill necessary for its use, it will be found, in a large proportion of cases at least, an indispensable resource, and an instrument most useful in the relief of suffering and in the prolongation of human life.

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CHANCRE OF THE TONSIL.*

By R. W. TAYLOR, M.D.,

SURGEON TO CHARITY HOSPITAL.

THIS form of chancre, although not common, is not so rare as was once supposed, and it possesses points of much interest.

First, as to its origin. While it may result from contagion from initial syphilitic lesions about the lips and face, as a consequence of kissing, and also from mediate contagion, as by articles like nursing-bottles, pencils, perhaps cigars, etc., it is also frequently caused by depraved and unnatural sexual contact, which of late years has increased to an alarming extent in America. These lesions are interesting, also, in their diagnostic relations; and, further, in the fact that there is little doubt that some cases of the *syphilis d'emblée*, or *larvée* of the French were really instances of tonsillar infection, since nothing is more assured than that acquired syphilis always begins in a chancre.

I will detail the cases observed by myself, and refer in brief to the best-authenticated of those now on record.

In June, 1882, a young woman, twenty-two years old, who had been under my care for some time for tinea trichophytina cruris, complained of slight sore throat. On examination, I found that there was some redness of the left tonsil, extending to the pillar of the fauces of the same side. It was not hard, nor were the ganglia perceptibly enlarged. I ordered a simple gargle, and awaited events. In a fortnight

* Read before the New York Academy of Medicine, May 15, 1884.

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she returned, and then I found that the tonsil was much reddened, swollen, indurated, and exulcerated. Her tonsils had been the seat of simple hypertrophy, and then the diseased one had become much more prominent than its fellow. The induration was almost cartilaginous. She complained of much pain in swallowing, and there was an abundant mucous secretion. The ganglia of the left side of the neck and those under the jaw were much enlarged and matted together into a diffuse mass. She had not had any ulceration elsewhere, and the inguinal ganglia were not swollen until three weeks later. In due time a papular roseola appeared. She was also much troubled with recurring mucous patches. In this case the redness and swelling were limited to the affected side and confined closely to the tonsil. I learned that she had been guilty of unnatural practices, and had thus become affected in the mouth.

I was asked to see the following case by my friend Dr. McBurney. On examination, I found the left tonsil swollen, indurated, and superficially exulcerated, and covered with a whitish, granular film. The induration was well marked. The ganglia of the same side were much swollen, and many of those under the jaw and over the sterno-cleido-mastoid muscle were matted together. I had the opportunity of studying this case for some time. Its history is best given in the language of Dr. Fuller and Dr. Woodward, *internes* at Bellevue Hospital. Dr. Woodward says:

"The patient, Henry Elsman, nine years old, a native of the United States, was admitted into Ward 7, November 9, 1882, for a compound fracture of the right tibia. The fracture was treated with a plaster splint, and the wound was sealed up with cotton and collodion. The patient's temperature was highest on the day of his admission, 100·1° F. After November 10th the temperature range was from 96·2° to less than 100° When admitted, the patient presented no eruption on his body, and no enlarged glands were noticed.

"In the history-book it is stated that on the 15th an eruption had been noticed on his body for a few days before, and was recognized as a secondary syphilide. The precise date when the eruption appeared cannot be obtained. Judging from the circumstances which I know existed at the time, I think it was about the 12th of November that the nurse called my attention to an eruption on the patient's body. I happened to be notified of the eruption before any other member of the staff. The eruption was then confined al-

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most entirely to the chest, and was quite pale. Three days later Dr. McBurney pronounced the case one of syphilis, and on that day the lesions in the throat were discovered. On the 12th, the glands in the left side of the neck were very much enlarged, and the patient told me that they had been so for a "long time." The glands on the right side were not much changed in size from normal. November 15th, the initial lesion was discovered on the left tonsil, as stated before. From the beginning the patient has had no sore throat, no loss of hair at any time, and no constitutional disturbance. The treatment has been by one sixty-fourth of a grain of corrosive sublimate three times a day, by the mouth, iodoform being applied to the left tonsil. December 5th inunctions of the oleate of mercury were begun. January 3d, it was noted that no iodoform had been applied for about two weeks; the other treatment had been continued."

Dr. Fuller writes: "Accept my apology for the delay in sending you the particulars of the history in the case of the boy Elsman whom you saw in Ward 7 lately. At best, they are very meagre. He says that one afternoon, as he was returning from school, in Vandewater Street—the date he can not give, or even guess at—he was induced to show a strange man the way to the water-closet. The compensation for this information, or guidance, was five cents. He says that, while in the water-closet, he was induced twice (at the same time) to submit to the attention of the man, the evidence of which he has at present in his throat. There was no other boy with him, the man was a stranger to him, and this occasion was the first and last of its kind. He says he can show me the water-closet, which is in Chatham Street, and further says that he and the man were surprised by a woman who lives in the house to which the water-closet is an attachment. At this date (December 5th) the eruption is well developed on his face and head, as well as the body. The pharyngeal ulcer is nearly healed."

My friend, Dr. G. H. Fox, sent for my inspection a man who was also infected on the left tonsil as a result of depraved habits with women.

I have now under my care a young woman, suffering from a tubercular syphilide, whose syphilis began on the left tonsil. She narrates with great minuteness the mode of contagion from unnatural practices with a lover. She had, at

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the time of her tonsillar chancre, difficulty of swallowing, with some pain and swelling of the glands.

My friend, Dr. E. Wigglesworth, of Boston, has sent me the following case:

"An enthusiastic medical student, now a physician, delivered, May 14th, 1879, an Irish woman of a child unconscious and apparently asphyxiated. With his own breath—mouth to mouth—he inflated the lungs of the child several times, but in vain. He then rinsed his mouth with gin, from a bottle belonging to the woman, having used some from the same bottle previously to rub the child's back.

"A month later, June 14th, he noticed a sore upon the right tonsil. This he burnt with nitrate of silver. The sore grew worse; the tonsil swelled; eating or drinking caused great pain.

"July 3d, the hypertrophied tonsil and the elongated uvula were both cut off. The whole cut surface ulcerated. The right side of the neck swelled to a large lump involving the glands beneath the jaw and ear. The pain in swallowing increased, and there was some difficulty in breathing. This condition improved after the application of leeches. There was insomnia. A fortnight at the sea-shore caused no improvement.

"Toward the end of July there appeared a pretty general eruption of papules, in some cases with slight pustulation, over the back, arms, and legs, and afterward upon the face, and a few on the scalp, accompanied by malaise, some fever, headache, pains in the knees, and lassitude. There was loss of hair, not only from the scalp, but also from the eyebrows and eye-lashes, all of which was subsequently regained after treatment.

"Still unsuspicious, or at all events unconvinced by these symptoms, the patient delayed consulting me until the 23d of August. He was put at once upon mercurial treatment with tonics; hygiene, great cleanliness, baths, and nourishing food were ordered, and drinking was prohibited. The only other symptoms were a mucous patch on the larynx and one upon the lower jaw. Improvement was rapid. The symptoms all disappeared. Treatment was continued for two years and a half, with intermissions. Then he took iodide of potassium for six months. There were no relapses, except possibly a slight mydriasis of the right eye, occurring last October, during my absence from the country, and yielding speedily to potassic iodide. There were no

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other lesions. The glands in the groins were never swollen, nor those of the elbows."

My late colleague, Dr. Bumstead, narrated at great length to me a case of chancre of the tonsil which was contracted by a man as a result of an unnatural and beastly practice.

Schirajew* reports two cases.

The first was that of a woman, twenty-eight years old, who had redness, swelling, induration, and exulceration of the left tonsil, which was afterward covered with a grayish-white exudation. There was indolent swelling of the ganglia. In due time she had general manifestations of syphilis.

The second case was that of a mother, whose child was infected by its nurse, who was infected on the left tonsil by the infant.

Spilmann† reports the case of a woman, of good health and irreproachable habits, who consulted him for slight sore throat and ganglionic enlargement at the right maxillary angle. On the left tonsil was a superficially ulcerated patch, of the size of a cent, covered with a whitish-gray film. The parotid gland of the same side was enlarged and painful. Later on, general manifestations appeared. Infection in this case was traced to contact with a nursing-bottle of a syphilitic child. The woman did not have any lesion of the genitals.

Hulot‡ reports the following cases: 1. That of a married woman, twenty-seven years of age, of good constitution, who had on the left tonsil an ulcer, red, swollen, and indurated. The left pillar of the fauces was also involved. The corresponding ganglia were enlarged. Her infection came from a chancre of the mouth of a friend's child, which she was in the habit of kissing. 2. A man, twenty-three years old, had an ulceration, irregular and uneven, on the

* "Harte Schanker an der Tonsillen," Petersburg med. Wochenschrift, 39, 1880, and "Vierteljahresschrift für Dermatologie und Syphilis," 13, 126, 1881.

† "Contribution à l'étude du chancre buccal," Annales de Dermatologie et de Syphiligraphie, x., 1880, p. 78. ‡ *Ibid.*

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right tonsil, which was covered with a whitish film, under which there was a reddened base. There was marked induration, the corresponding ganglia were enlarged and syphilis appeared later on. The man could give no account of the mode of contagion. His habits were none of the best. 3. A woman having chancre of the right tonsil caused by kissing her daughter, who had mucous patches in the mouth. 4. A woman, married, thirty years of age, had a chancre on the right tonsil, contracted from her daughter, who had a similar lesion on the neck. She afterward developed syphilis.

C. Boeck* gives the details of four cases of tonsillar syphilis, in two of which infection occurred from the use of eating and drinking vessels, and the third from a kiss. In the fourth the origin was not discovered.

The clinical history of these chancres is as follows: The first appearance noted are redness and swelling, without perceptible induration. In the course of a few days these symptoms are accentuated, the redness is greater, the hypertrophy is more marked, and there is also superficial erosion of the organ. Then this exulceration may increase, and is usually accompanied by the appearance of a grayish-white coating, which may be very thin or thicker, and may be of granular appearance and irregularly distributed over the ulcer. The induration is usually well marked, sometimes even cartilaginous. It, of course, differs in accordance with the density of the tonsil. If the latter has been the seat of chronic hypertrophy, it will be hard and firm; if it was previously healthy, it may only be slightly indurated. The prominence of the organ in disease will in a measure also depend on its size and condition previous to infection.

The diagnosis rests between mucous patches and syphilitic ulcerated, sclerosed tonsils, in both of which the lesions will not be so sharply confined to one side, nor accompanied by such well-marked adenopathy. Again, the history of

* "Vier Fälle von syph. Infect. durch die Tonsille," Tidskrift for pract. Med., No. 13, 1883; Monatshefte für prakt. Dermatologie, Oct., 1883.

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the case will often establish the late origin of the lesions. The subjective symptoms are more or less difficulty in swallowing, perhaps pain, and uneasiness on the affected side, swelling of the corresponding glands, parotid and submaxillary, and of the lymphatic ganglia. This swelling, besides being at first unilateral, is always out of proportion to that observed to accompany secondary and tertiary lesions.

The points of diagnosis are as follows:

1. The details of the mode of infection, either from syphilitic sores, primary or secondary, chiefly about the mouth or face, and mostly by kissing; from infection by some article, such as a nursing-bottle, cigar, pipe, cup, or the like; or from indulgence in bestial practices.

2. The slow, unilateral development of the chancre, with corresponding gland and ganglion enlargements, so well marked.

3. The limitation of the lesion to the affected side.

4. The difficulty in deglutition, and even pain, which is referred to one side.

5. The history of the evolution of the syphilis, the absence of chancre from other parts, especially the genitals, and the much less indurated condition of the ganglia seated elsewhere. Those that are seated at a distance may not be affected until near the date of the evolution of secondary manifestations.

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A PLEA FOR MORE HEROIC SURGICAL INTERFERENCE IN AFFECTIONS OF THE BRAIN.*

By R. W. AMIDON, M.D.,

OF NEW YORK.

THE question must arise in the mind of one watching the progress of medical science and practice, Why is it that since Broca, in 1871, guided by well-determined anatomical and physiological laws, trephined a paralyzed aphasic over the centre for speech and greatly relieved the symptoms by evacuating a cerebral abscess, Why is it, that in the succeeding thirteen years, similar operations scientifically planned and executed, are so seldom performed, and they hardly reach a score? One answer, perhaps the chief one, lies in this fact, that probably neither before nor since has there been joined in one man such anatomical and physiological knowledge of the nervous system, with such surgical skill and daring as existed in the lamented Broca. He was a man who devoted his time *entirely* to science, study, laboratory work, and his hospital service; early every morning he spent hours in his wards at Hôpital Necker, encased in a black cambric gown, ready for anything, followed always by a throng of eager students.

It was he who localized the centre for articulate speech, thus opening up the wonderful realms of cerebral localization; it was he who first acurately pointed out the relations of certain important cerebral convolutions to fixed external

* Read before the New York Academy of Medicine, June 5, 1884.

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landmarks, thus making the brain visible through its opaque envelopes, and it was he whose hand, guided by these scientific data, drove the trephine directly toward a hidden cerebral abscess.

Surgeons may well admire his daring, neurologists his learning. That such an example has almost fallen to the ground in the past thirteen years cannot be attributed to inaction, for, during those years, surgical science has made wonderful onward strides, nor have physiologists allowed the expanse of the cerebral cortex to remain unexplored, but specialism has compelled the surgeon to neglect his study of cerebral anatomy and physiology, while the neurologist, even if he possess the requisite surgical skill, lacks the material upon which to test his knowledge. Deplorable indeed is that overfine subdivision of practice which allows *one* physician to cling to obsolete methods, *another* to soar in a cloud of unproven theories, while the poor patient gets well if he can.

Another very serious drawback to the advance of cerebral surgery has been the tenacity with which surgeons have clung to the idea that trephining of itself is a dangerous operation. To prove that penetrating the envelopes of the brain is *not* a dangerous operation, will occupy the first and larger part of this paper, for this proved will remove the greatest objection that can be offered to more heroic cerebral surgery.

The operation of trephining is very old, and is practiced by all races. In France, among débris belonging to the neolithic age, with vessels, utensils, and weapons of stone, are found skulls having smooth, oval, and bevelled edged holes, which were undoubtedly made during life and for a special purpose.*

For an operation of such extreme antiquity accurate data as to its safety are extremely meagre. Our modern treatises on surgery are surprisingly wanted in statistics. Judging from their figures, the operation is indeed a dangerous one,

* Prunieres, Bull. de la Soc. d'Anthropol. de Paris, 1878, p. 420.

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its mortality varying, according to them, from forty to seventy-five per cent. The deductions one would naturally draw from these statements and figures are fallacious, for the reason that many of these deaths occurred from lesions which antedated the operation, lesions which would of themselves have ultimately caused death. They do not attempt to ascertain in what percentage of cases the operation excites the fatal issue.

The nearest approach to an estimation of the exact mortality of the operation appeared in *St. Bartholomew's Hospital Reports* for 1882, vol. xviii., p. 213. In an article entitled "Is trephining the skull a dangerous operation *per se?*" Dr. Walsham has looked up and analyzed six hundred and eighty-six cases in which, for different purposes, the cranial cavity has been opened or explored, not using the word "trephining" in its strict sense. Of these six hundred and eighty-six, four hundred and seventeen survived, showing thus a mortality of 39.3 per cent. He divides these cases into five classes: First, preventive trephining, in which there were no cerebral symptoms, but in almost all a compound fracture of the skull existed. Here the mortality was 21.9 per cent. Second, immediate curative trephining, in which severe cerebral symptoms existed. Here 48.4 per cent. died. Third, intermediate curative trephining, in which cerebral symptoms were present. Here twenty-seven per cent. died. Fourth, delayed trephining where generally inflammatory symptoms had set in. Here 58.5 per cent. died. Fifth, late trephining, in which 22 per cent. died.

Of the latter class, in which there were not at the time of operating any symptoms liable to prove fatal, there were over eighty cases in which no wound existed in the head at the time; of these 14.4 per cent. died, and of forty cases in which there was a fistulous track leading down to dead bone or a purulent collection within the cranium, only 2.5 per cent. died.

He thus estimates that in one hundred and twenty-two cases of late trephining, in which there was present at the time no condition endangering life, only 10.6 per cent. died.

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In a later article (*St. Bartholomew's Hospital Reports* for 1883, vol. xix,. p. 127, "On trephining the skull in traumatic epilepsy"), he cites eighty-four cases, of which seventeen died, showing a mortality of 20.2 per cent. But he adds that if we except deaths following too long after the trephining to be attributed to the operation, we would see that here too the mortality would be reduced to about 10.6 per cent.

The fairness of Walsham's deductions no one reading his article can doubt, but favorable as his figures are as compared with those of succeeding writers, I think that his percentage of 10.6 as the mortality of the operation *per se* is too high, and I base my statement on the following fact, viz., that while his tables contain *very many* recent cases, they contain more cases which antedate antiseptic surgery. No one for a moment doubts that since the introduction of Listerism, fatal results follow accidental or surgical traumatism much less frequently than before. Particularly is this the case in wounds involving bone. For this reason Walsham's tables are not exact exponents of the results of modern surgery.

In the last few days I have collected one hundred cases in which trephining or kindred operations about the head have been performed for various causes, taking care to select cases treated and reported since 1879, since Listerism has come into general use. Not, however, confining myself to cases in which the Lister dressing was used.

These cases I have not subdivided into classes, as did Walsham, but have tabulated so as to show the injury or pathological condition present, the prominent symptoms preceding and following the operation, the kind of operation and its findings, the dressing or subsequent treatment of the wound, and the final result. From these data it has been possible for me to arrive at pretty conclusive evidence as to the mortality of the operation *per se* as looked at in the light of modern surgery.

Of these one hundred cases taken just as they came in medical journals, since 1879, twenty-six died. Of these

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twenty-six, twenty-three presented, at the time of operation, symptoms endangering life, thus leaving only three cases in which the fatal issue could even remotely be traced to the operation.

As this percentage seems extremely low and would render the operation as now conducted practically harmless, it may be well to summarize the reasons for rejecting the twenty-three deaths as independent of the operation.

In six cases symptoms of abscess of the brain declared themselves before the operation was performed. In four a meningitis existed at the time of operation. In four cases shock caused death; one died of hemorrhage from a branch of the middle meningeal artery (not wounded in the operation); one died of hemorrhage from the middle cerebral artery, severed by a stab-wound of the head; one died of hemorrhage from a lacerated longitudinal sinus; one of galloping consumption, which was hereditary; one of extensive laceration of the brain; one of opium poisoning; and three I accept, on authority of the physician reporting them, as not dying from the effects of the operation. The cases in which the operation seemed to cause death being so few, will be mentioned more in detail.

The first was one reported by Sylvestrini.*

The subject was a male, of fifteen, who received the kick of a horse in the right temporo-frontal region. Two months after the injury the boy had a temporary right hemiplegia. Five months later paralysis of the right arm and leg and the lower part of the right side of the face came on. This was accompanied by right hemiepilepsy and complete aphasia, incontinence of urine and fæces. Sylvestrini trephined over the centres for the upper and lower extremities, and extracted piece-meal a hard, organized clot, three centimetres in diameter by one thick. Death occurred on the fourth day. On autopsy there was found to have been a purulent meningitis and two abscesses of the brain, one at the foot of the ascending frontal convolution, and one under the inferior extremity of the fissure of Rolando.

There is a doubt as to whether the operation in this case

* Bull. de l'Acad. de Méd. de Paris, 1883, p. 439.

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had, after all, much to do with the fatal result. The symptoms preceding the operations were certainly of a very grave nature, and, considering their slow formation, the cerebral abscesses may well have existed before the operation, in which case the facial paralysis and aphasia could very easily be accounted for, and the fatal issue explained. Still, in the operation of removing an organized clot from an otherwise healthy brain, sufficient violence might have been done the parts to excite the fatal suppurative inflammation.

The second case in which the operation may have caused death is reported by Briddon.*

The subject was a male of sixty-one. A brick fell on his head, causing a compound depressed fracture, four centimetres long, a little to the right of the vertex. The depressed bone was removed, and the margins of the wound were smoothed with a rongeur. The wound was dressed with *proof spirit*. On the third day after the operation the patient had a chill, fever, headache, and photophobia. On the sixth day vomiting and stupor occurred. On the eighth day the dura mater was incised, and a little pus and blood evacuated. On the ninth day there was a chill, with involuntary evacuations, twitchings of the face, and death. On autopsy, there was found a false membrane adherent to the left hemisphere, and an accumulation of greenish pus in the arachnoid.

The fatal issue, if it did not arise from natural and unavoidable causes, *might* have come from the surgical dressing in this case. But the injury itself—so apt to excite fatal intracranial inflammation—may alone be responsible for the fatal result. Certainly the operation, promptly, neatly, and judiciously performed, did not cause death.

The third case is that reported by Noyes.†

A male of nineteen received the entire breech-pin of an exploding gun in his right orbit. The breech-pin was afterward found to have projected four centimetres through the roof of the orbit into the right frontal lobe of the brain. The boy was insensible four days, but soon recover-

* N. Y. Med. Jour., 1879, xxix., 309.

† Amer. Jour. Med. Sci., 1882, lxxxiv., 45.

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ed almost perfectly, with the exception of a destruction of the right eye, and a fistulous track which led down to the foreign body. It was not dreamed then that it had penetrated the brain. The foreign body was found and much force was required to dislodge it from the roof of the orbit and brain.

Sixteen days later, left hemiparesis and other symptoms led to trephining about 7.5 centimetres above the right external angular process of the frontal bone, the supposition being that a secondary abscess had formed there. About twenty cc. of dark purulent matter were evacuated by an aspirator needle. A probe and drainage-tube were passed through the brain to the opening in the roof of the orbit. This was syringed out with a four per cent. solution of boracic acid. On the twenty-seventh day there was double optic neuritis (tendency to choked disk having been previously noticed). On the thirty-seventh day the finger was passed eight centimetres through the roof of the orbit, and the brain found badly disorganized. Death occurred on the thirty-ninth day after the operation, and the sixth month after the injury.

On autopsy there was found an immense cavity in the right frontal lobe, but neither this nor the external wounds communicated with the subdural cavity.

There was a basilar meningitis, or, as the author puts it, "a sero-purulent, yellowish-green exudation into the meshes of the pia mater, most abundant over the medulla oblongata, pons, interpeduncular space, and inner parts of the fissures of Sylvius. This exudation is as much on one side of the brain as the other, and does not extend to the convexity."

In this very interesting case the surgical interference probably hastened the fatal issue. It was stated in the history of the case that one day there was discharged from the orbital opening a membrane which had doubtless formed an encapsulating sheath for the part of the foreign body which projected into the brain. For this reason, and because of the absence for so long a time of any cerebral symptoms, it is possible that this boy might have lived for years. It would seem, however, that the basilar meningitis was entirely independent of the operation because of the inability of any injected fluid, or any discharge from the cerebral

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abscess, to gain access to the base of the brain. This patient took daily from 120 to 150 centigrammes of quinine, and there is a possibility that that *may* have had something to do with the fatal issue.

These three cases show the tremendous difficulty of determining with exactness the part operative interference has in the production of death. But, to recapitulate, a careful review of the cases collected shows that, of one hundred unselected cases, twenty-six died; but that in twenty-three, there existed, at the time of operation, symptoms which of themselves endangered life, thus leaving for the operation *per se* a mortality of 3 per cent. This certainly should rob the operation of its terrors.

The introduction of three interesting cases at this point may show what extensive injury to the cranial bone may be recovered from.

In a case of syphilitic necrosis there was removed the frontal part of the frontal bone, the roof of both orbits, the cribriform plate of the ethmoid, parts of both superior maxillæ, the palate, and left greater wing of the sphenoid, without any untoward symptoms occurring.*

McCutcheon† narrates a remarkable case in which he trephined five consecutive times.

The patient, an adult male, received a blow near the occipital protuberance. Six weeks of blindness supervened, which disappeared after trephining. Later, after the wound had all healed, symptoms of compression came on, which yielded to a second operation. Epilepsy appeared after a period of apparent cure. The third operation was successful. Atrocious headaches soon led to a fourth operation; while later, necrosed bone necessitated a fifth and last operation.

A man had his head caught between the timbers of a bridge and the boiler of a steamboat going at a rapid rate. The frontal bone was torn off at its lower border and raised up five centimetres. It could be raised and lowered like the lid of a box, the scalp and coronal suture acting like a

* Norton, Trans. Clin. Soc., Lond., 1880, xiii., 48.

† New Orleans Med. and Surg. Jour., 1881, ix., 259.

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hinge. The anterior lobes of the brain were elevated 1.5 centimetres. The bones of both orbits and upper part of the nose were crushed; one piece was driven into the brain which was much lacerated. Seven fragments were removed, including the roof of both orbits, the septum between the eyes, and some of the nasal bones. A portion of the right temporal bone was crushed in, and there was a compound depressed fracture of the left parietal bone four centimetres long. Much lacerated cerebral substance was lost. Clotted blood and débris were removed, the frontal bone was adjusted, and drainage secured. Convalescence was marked by an immense discharge of serum and pus. Recovery was perfect as regards mental and physical condition, but there remained impairment of vision in the left eye, diplopia, impairment of hearing in the left ear, and a total loss of the sense of smell.*

The reluctance of the surgeon to open the cranium seems avidity as compared with his hesitation in piercing the dura mater. The protection afforded by antiseptic precautions has long since thrown down the barrier of other serous sacs, and now every day closed serous or synovial cavities are invaded for diseases not immediately endangering life. Not so with the sac surrounding the brain. The dura is not very vascular, nor does it easily take on ordinary inflammatory processes.

Vessels prone to dilate and allow transudation and exudation are just as readily made to contract by local or systemic treatment. The same readiness of the pia mater to become acutely inflamed, also renders it peculiarly sensitive to prophylactic or remedial measures.

Of the hundred cases which I have collected, the dura mater was opened in thirty-three. In twenty-three the dura was lacerated by the traumatism, of these nine, or 39 per cent., died. In ten cases the dura was purposely opened during the operation, and of these four, or 40 per cent., died.

This would seem to indicate that opening the dura mater led to fatal results in 39.3 per cent. of all cases, but when we pause to consider that opening of the dura during the trau-

* Palmer, Trans. Med. Assoc. of Wisconsin, 1880, xiv., 59.

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matism is in most cases accompanied by laceration of the brain, hemorrhage, and often the introduction of foreign bodies, and that intentional exposure of the brain is seldom resorted to until dangerous inflammatory processes are already at work, we will find that this explorative procedure is, if not harmless, at least not fatal in 39.3 per cent. of cases.

Of the nine fatal cases in which the dura was opened traumatically, four died of extensive laceration of the brain and shock, two died from hemorrhage, one from the middle meningeal, one from the middle cerebral artery, and one died from opium. Of the four fatal cases in which the dura was intentionally opened, three already presented lesions of diffuse or circumscribed suppurative inflammation. In *one* case only, that of Sylvestrini, did the membranes, healthy when first opened, subsequently take on a fatal inflammation. Thus we see that of the thirteen fatal cases, in only one could death be traced to exposing the brain. This reduces the mortality of the operation to 7.6 per cent.

It is exceedingly exasperating that Sylvestrini neglects to state what dressing he employed or whether he did or did not conduct the operation with antiseptic precautions.

The surgeon who boldly trephines the skull, and then hesitatingly and after mature deliberation opens the dura, will generally draw back, lay down his instruments and refuse to go further when he reaches the brain. It is not because he considers it such a vital organ, for he knows full well that large areas of the brain are less essential to life than are the less noble organs, the heart, lungs, liver, and kidneys. Neither is it because he thinks it incapable of sustaining shock or taking on reparative processes, because he has seen it entirely recover from tremendous traumatisms, he has watched it granulate and cicatrize like any other wounded part. The cerebral cortex seems to be a sort of "dead line" inside the prison walls of conservative surgery, across which even the most daring are tempted or the most unwilling are dragged only by sure indications or desperate chances. Let us see how much foundation, in fact, there is for the sacredness in which the cerebrum is held. Leaving

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one side the older, but remarkable cases, such as the celebrated tamping-iron case of Drs. Harlow and Bigelow, we will cite more recent instances which demonstrate the toleration and reparative power of the brain.

A male, of thirty-one, received a punctured wound from a file which fell some distance, striking him at the posterior superior angle of the right parietal bone. Three days later, headache, delirium, and slight left hemiplegia came on. One month after the injury he was trephined, the dura was punctured and pus escaped in jets. He was discharged cured in two months. Nine months later convulsions and left hemiplegia returned. The old wound was re-opened; this operation simply affording relief. Seven months later, headache came on, followed in a few days by convulsions. Speech and vision were impaired. The removal of a small piece of dead bone afforded no improvement. In four months the case came again under notice, with left hemiplegia most marked in the leg and double optic neuritis. Another small piece of dead bone was taken out.

The old trephine hole was enlarged, the dura punctured and pus escaped in jets. About 250 cc. escaped during the night. A director was passed five centimetres into the brain. After the pus was evacuated, the patient walked and moved the left arm and fingers freely, and speech was not so thick. One month after the operation, the headache returned and a convulsion occurred. At the same time the discharge from the wound increased. In fifteen days the wound healed, and in thirty days the patient was discharged cured, two months after the last operation, and sixteen months after the injury.*

Bullet weighing 2.5 grammes, entered five centimetres above eyebrows and one centimetre to the left of the median line. Of its own weight, probe went back its whole length toward the occiput. Free drainage was secured and carbolized oil was used as a dressing. The left optic nerve was swollen. On fourth day, when almost well, rigors and violent pain in the wound set in. Pulse 100; temperature 40.5° C. Unconsciousness, wild delirium, vomiting, and slight right facial paresis. Recovery without operation on seventy-fourth day.†

A bullet entering at point about four centimetres above

* Rivington, Brain, 1881 and 1882, iv., 413.

† Barton, Lancet, 1881, i., 248.

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the left eye a little to the left of the median line, pierced the first frontal convolution, traversed the brain backward and a little outward, and emerged from the upper part of the parietal lobule, where it lay slightly imbedded in the brain. The symptoms were not alarming. The course of the bullet was ascertained by careful probing, and the trephine was applied over the supposed site of the ball. After a short search it was found, and a drainage apparatus composed of horse-hair and catgut passed through the entire track of the ball. The operation was done with antiseptic precautions, and the wounds were dressed with iodoform. Recovery was uninterrupted and complete. The slight weakness of the right hand and loss of memory rapidly disappeared.*

The whole of the right parietal, parts of the right occipital, temporal, and left parietal bones being torn away with extensive laceration and loss of cerebral substance, the case was treated antiseptically without operation and recovered perfectly.†

A man was struck by the pilot of an engine and his head was cut open from the inner canthus of the left eye to the occiput. A furrow eight centimetres long was cut in the anterior lobe of the left hemisphere. Under cold applications he recovered.‡

A boy of six years was stepped on by a horse. The left side of the head was crushed in, blood, bone, and brain escaping. Blood and pieces of brain exuded from left ear. It was estimated that sixty-two cc. of cerebral substance were lost. There were three compound fractures. There was a right hemiplegia which disappeared and an aphasia which improved.§

A boy of fourteen, was struck on the head by a stone weighing five kilogrammes. A large hematoma formed, which was opened; bone to the extent of 7.5 x 6.5 centimetres was removed, and thirty grammes of clear cerebral substance were saved. A carbolic dressing was used. Later, a large hernia cerebri formed and was cut off. Recovery took place without paralysis.‖

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* Case of Dr. Wm. F. Fluhrer, unpublished. Quoted by permission.

† Olpherts, Br. Med. Jour., 1882, ii., 89.

‡ Wood, Amer. Jour. Med. Sci., 1881., lxxxii., 168.

§ Hoskins, Lancet, 1883, ii., 99.

‖ Demons, Bull. et Mém. de la Soc. de Chir., 1883, iv., 482.

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A man of thirty-nine, fell fourteen metres, causing a slight wound in the right fronto-parietal region. Ten months later, convulsions and paralysis set in. A fissured fracture was found three centimetres long along the Rolandic line. The skull was trephined and the dura opened. Blood and cerebro-spinal fluid escaped, and the cortex was found disorganized over a considerable extent for a depth of many millimetres. Recovery with disappearance of the paralysis supervened.*

Adding to these traumatic cases the numerous instances in which immense hemorrhages, large areas of softening, stupendous and multiple abscess cavities, and rapidly growing neoplasms compress or usurp the place of parts of the brain without disturbing the vital functions and often without destroying life, we must conclude that the brain shows a remarkabie tolerance of injury and a tremendous reparative power.

The chapter in cranio-cerebral topography which will be found of most utility for clinical and experimental purposes, is the part dealing with the relations borne by individual convolutions, not to the denuded skull, but to the external landmarks demonstrable on the living head. To this part special attention will be paid, the facts being chiefly drawn from Broca, Féré, and Turner.

To make all observations uniform, the head must have a constant position. This position is that which is assumed by a skull, without the inferior maxilla, resting on its alveolar processes and occipital bone. This is called the alveolo-condyloid plane, and forms the basis for all future measurements. A perpendicular from this line passing through the external auditory meatus, intersects the vertex at a point called the bregma. This is called the auriculo-bregmatic line. The most important landmark in the brain is the fissure of Rolando. Its upper extremity lies 4.5 centimetres behind the bregma (Broca, Féré, etc.). Its lower extremity falls about 0.5 centimetre behind the auriculo-bregmatic line, and a little above a line Féré draws through the head parallel to the basal plane, passing through the

* Benton, Proc. Med. Soc. Kings Co., 1883–84, viii., 256.

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apex of the lambdoidal suture and the superciliary ridge of the frontal bone. (See figure.) This would bring the lower end of the fissure of Rolando about 6 centimetres above and a little behind the external auditory canal.

Having thus located the fissure of Rolando, enables us to map out the neighboring convolutions, which are to-day held to be of the greatest importance, as they are supposed to contain the psycho-motor centres of the opposite half of the head, body, and extremities.

The ascending parietal convolution will, of course, underlie the surface of the head just behind this region, while the ascending frontal is just in front.

The first or superior frontal convolution will be found commencing about 2-5 centimetres behind the bregma, and passing forward near the median line toward the orbit. The second frontal convolution will occupy a similar but more lateral position, while the third frontal convolution lies wholly in front of the auriculo-bregmatic line, and on a plane 5 centimetres above the external auditory meatus. Its folded or central part is about 2.5 centimetres in front of the auriculo-bregmatic line, or about 2 centimetres behind the external angular process of the frontal bone.

The tip of the sphenoidal lobe is 1 centimetre behind the external angular process of the frontal bone, hence at this point the fissure of Sylvius commences.

The middle or horizontal part of the fissure coincides pretty nearly with the squamo-parietal suture, and hence falls near the fronto-lambdoidal line. The termination of the fissure is in the lower posterior parietal region, and this would bring the supra-marginal convolution under the parietal eminence (Turner) and the angular gyrus below and a little behind the same.

The occipital fissure varies very little from the commencement of the lambdoidal suture, a point pretty easily m ade out in most heads. The relations of the fissure of Rolando to the antero-posterior diameter of the brain as determined by Féré are interesting. Its superior extremity is in the average 11.1 centimetres from the frontal extremity (range

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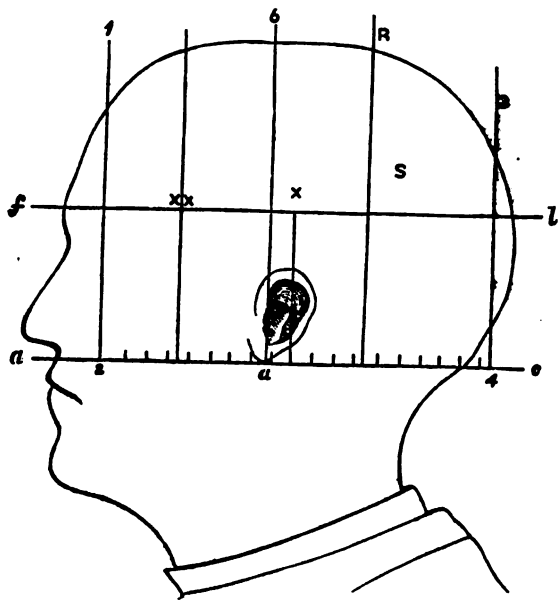
from 9.5–12.5 centimetres) and 4–9 centimetres from the occipital extremity.

The lower extremity of the fissure is 7.1 (6.4–8.2) centimetres from the frontal extremities, and 8.9 centimetres (7.2–10) from the occipital extremity of the brain.

With such data as are contained in the above paragraphs at our disposal, we can see the convolutions, so to speak, through the scalp, skull, and meninges.



Outline of head, reduced one-third, on which a modified system of Féré's lines is drawn. *AC*, alveolo-condyloid ; *AB*, auriculo-bregmatic line ; *FL*, fronto-lambdoidal line ; 1, 2, frontal limit ; 3, 4, occipital limit of the brain ; *R*, posterior extremity of the fissure of Rolando : *X*, anterior extremity, same ; *XX*, location of the middle fold of the third frontal convolution, a little below and in front of which lies the tip of the sphenoidal lobe ; *S*, the posterior extremity of the fissure of Sylvius, and the intersection of the lines 3, 4, and *FL*, locates the occipital fissure.

Of cerebral localization as bearing on this subject, much might be, but very little need be, said. Neurologists are sure that there are certain regions of the brain which when irritated, compressed, or destroyed, give rise to perfectly unmistakable symptoms.

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To recapitulate:

We have trephining, an operation proving fatal in only three per cent. of published cases:

Opening the dura mater, fatal in only 7.6 per cent. of published cases:

We have the brain, an organ tolerant of injury and ready take on a reparative process:

We are possessed of a knowledge which enables us to tell when certain parts of the brain are diseased; and we also have anatomical data which tell us just where to pierce the envelopes of the brain to reach a certain definite part of its convexity. We have all the elements of safety and anatomical accuracy, why should cerebral surgery not advance with pulmonary, renal, intestinal, and ovarian surgery?

My allotted time and space are exhausted, and I close with a few practical remarks suggested by the subject in hand.

The substitution of the dental engine and a burr or drill cutting on the side for the ordinary trephine strikes me as advantageous. It has been used and advocated by Dorr* and Roberts.† Its advantage over the trephine is principally that with it you can cut away as much or little bone as you please, and make an opening of any shape you please. It is especially useful in trimming down the edge of overriding bone to allow the elevation of depressed fragments.

Let the operation always be done with antiseptic precautions. Try and secure only approximate coaptation of the flaps. Provide the freest possible drainage. Use cold antiseptic dressings, without much compression. Enjoin the strictest quiet in a posture facilitating drainage. Simple diet, and a slightly loose condition of the bowels. On the slightest rise of arterial tension or temperature, give jaborandi or aconite to the production of physiological effects. Quinine and alcohol should, I think, be given only in tonic doses. An anodyne is often indicated, and it is my advice never to use opium, or any of its preparations or derivatives.

* Buff. Medical and Surgical Journal, 1879–80, vol. xix., p. 475.

† Philadelphia Medical Times, 1881–82, vol. xii., p. 206.

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To ease pain, quiet delirium, or induce sleep, use the hydrate of chloral in small repeated doses (.60–1, every ten or fifteen minutes). Quinine and alchohol in large, and opium in *any* dose, aggravate intracranial inflammation when present, and, I think, may excite it.

These suggestions apply equally well, or with still greater force, to cases in which the dura mater or brain is accidentally or intentionally invaded.

A few words as to what I consider good indications for opening the skull.

An injury of the vault, however slight the marks of external violence, provided there be coma, aphasia, hemiplegia, or hemispasm of the lower part of the face, of the arm, or leg, or all three, constituting hemiepilepsy; whether accompanied or not by chills, fever, headache, and vomiting. General epileptic convulsions do not constitute so good indications for operation. Every case of compound fracture of the skull whether there be cerebral symptoms or not. Cases in which, after the lapse of months or years even, unmistakable cerebral symptoms follow an injury to the head. Atrocious and incurable headaches, particularly if localized, aphasia, monoplegias and monospasms, hemiplegic or hemiepileptic seizures or general epileptic attacks, if they have an aura pointing to a localized lesion. In addition to the bone, the dura mater should be opened; in all cases in which exploration with a hypodermic needle discloses the products of purulent inflammation or a great deal of fluid blood under it. In all cases in which a serious lesion of the brain is suspected, but cannot be otherwise proven.

In addition to the bone and dura mater the brain should be explored, delicately with a probe, in all penetrating wounds of its substance, punctured, lacerated, or gunshot. Its mass should be invaded, even when superficially intact, by a fine, blunt exploring needle, when the presence of foreign bodies or hidden collections of pus are suspected, and, for the extraction or evacuation of such, larger openings should be made with a dull instrument.

Finally, accessible neoplasms of the brain, which have re-

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sisted medicinal treatment, and which continue to grow and threaten life, should be removed for the reason that they are generally single, seldom have secondary deposits, are surrounded by an inflammatory zone of demarcation, and *always* kill by pressure.

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THE THREE TONSILS—SOME PRACTICAL SUGGESTIONS IN REGARD TO THEIR STRUCTURE, FUNCTION, AND DISEASES.*

By F. H. BOSWORTH, M.D.,

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I INVITE your attention this evening to a consideration of the three tonsils, in order that I may bring forward certain views in regard to them which I have for some time entertained, and which, while contrary, I think, to the generally accepted opinion, will, if true, serve to clear up much that is vague in the prevailing views as to the functions of these glands, and also to give a more practical direction to our therapeutical measures in the management of many of the commoner forms of disease in the fauces.

By the three tonsils it is to be understood that I refer to the two glandular masses found between the pillars of the fauces, and to which the name tonsil is usually applied, and to that mass of glands which is found in the vault of the pharynx, and which was first recognized and described by William Hunter,† and subsequently, and to a fuller extent, by Luschka,‡ and to which the name of Luschka's tonsil has been given, and also that of *the pharyngeal tonsil.* These three masses being so nearly identical in their structure,

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* Read before the New York Academy of Medicine, October 2, 1884.

† Cohen: Diseases of the Throat, second edition, p. 253.

‡ Der Schlundkopf der Menschen.

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function, and diseases, I think that they may be properly designated as the three tonsils. The masses between the pillars of the fauces will be spoken of as the faucial tonsils, while that structure at the vault of the pharynx will be designated as the pharyngeal tonsil.

It has been the custom to describe the faucial tonsils as "two almond-shaped organs lying between the pillars of the fauces, and covered by a fibrous investing membrane or sheath, in which are from seven to twelve openings, which mark the orifices of a number of mucous glands, of which the organs are composed." There are, I think, several sources of error in this description. The faucial tonsil is not covered by a fibrous sheath. Underlaying it there is a more or less dense connective-tissue layer, which is continuous with the submucous layer which underlies all mucous membranes. Beneath the mass this is thickened by the same morbid process which has developed the tonsil. Further than this there is no sheath to the gland. It is not an almond-shaped organ as a rule, but is of whatever shape the morbid process which has caused its growth may give it. The number of openings on its surface is entirely dependent upon the number of glands which are involved in the hypertrophic processes which have produced it. It is not an organ of the body in the sense that the liver and spleen are organs, and which I think is a commonly accepted view, and therefore, in this sense, has no especial function to perform in the economy. In my work on "Diseases of the Throat," published three years ago, I subjected myself to criticism by the assertion that in the healthy throat there are virtually no tonsils. This opinion I still entertain. The "almond-shaped organ," etc., described by anatomists does not exist in a healthy throat, but is the result of a morbid process. This morbid process may have been of such limited extent as to have developed but a small tonsil, and one not sufficient to give rise to any other than trivial symptoms; or it may have gone to the extent of developing a mass of sufficient extent to cause serious disturbances. All mucous membranes are richly endowed with glands, in order that

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they may be kept in that soft and pliable condition which the proper performance of their functions demands. Perhaps no portion of the mucous tract demands a greater supply of mucus in the performance of its functions than the upper air-tract. In this region, therefore, we find these muciparous glands not only richly distributed throughout the membrane, but also aggregated in masses. This tendency to aggregation is especially noticeable in the pharyngeal vault, and between the pillars of the fauces. In a condition of health these aggregations of glands do not project prominently from the membrane, and hence, in a perfectly healthy state, their existence is not easily demonstrated by gross inspection.

The mucous membrane of the upper air-passages, however, perhaps more than any other portion of the body, is liable to be the seat of morbid action. It is a very noticeable clinical fact, also, that while in adults it is the mucous membrane proper which is most liable to be the seat of disease, in children it is the glandular structures which are especially susceptible; hence we find that morbid conditions of these glands, both in the fauces and in the pharyngeal vault, are of exceedingly frequent occurrence, especially in children.

The tendency of chronic inflammatory processes is to develop in hypertrophy. Hence we find a moderate hypertrophy of these glandular masses of exceedingly frequent occurrence in young people, constituting in the one case so-called enlarged faucial tonsils, and in the other an enlarged pharyngeal tonsil.

In order to make clearer my meaning, I will very briefly allude to the anatomy and functions of the upper air-tract. The nasal cavity proper extends from the nostrils in front to the posterior nares behind. They are lined by mucous membrane covered with columnar ciliated epithelia, whose ciliæ move in a direction from behind forward. These cavities fulfil a double function; they contain the distribution of the olfactory nerve and preside over the function of olfaction. With this we have nothing to do in the present con-

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sideration. The other function consists in guarding the entrance to the lungs, warming, moistening, and cleansing the inspired air. For the latter purpose the nasal mucous membrane is very richly supplied with glands which pour out an abundant sero-mucus, by which the inspired air becomes charged with moisture. The nasal cavities, then, belong purely to the air-tract. Behind the nasal chamber lies the pharynx. This is usually described as one cavity, extending from the basilar process of the occipital bone to the œsophagus. There is, I think, a source of error in this. That portion of the pharynx which lies above the border of the soft palate is lined with a mucous membrane covered with columnar ciliated epithelia, and very richly endowed with muciparous glands, those in the vault constituting the pharyngeal tonsil. Below the border of the soft palate the pharynx is lined with a mucous membrane, which is covered with pavement epithelia and very scantily supplied with glands. The characteristic anatomical feature of the air-passages is that they are lined with a mucous membrane covered by columnar ciliated epithelia, and richly endowed with mucous glands: a form of mucous membrane which, while exceedingly delicate and sensitive, is eminently adapted to its function. It tolerates the passage of air, corrects its temperature, regulates its humidity, and prepares it for the lungs. At the same time it resents the impact of any foreign body, harsh substance, or the entrance of any irritating gas or vapor. It is also endowed with glands which secrete a more fluid mucus, more of the character of a sero-mucus.

On the other hand, the food-passage is lined with a mucous membrane which is covered with squamous epithelia. Its function is to allow the passage of masses of food of oftentimes firm consistence, but whose impact upon the membrane of the air-passage would not be tolerated. For this purpose the membrane is so constructed that it is hard, dense, and resisting, and not especially sensitive. It is richly endowed with glands which pour out a viscid mucus, whose function is as a lubricant mainly.

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The pharynx, then, as it is usually described by anatomists, is really composed of two cavities differing materially in structure and function. The upper pharynx belongs to the air-tract, while the lower pharynx belongs to the food-tract. This view is still further sustained by the fact that an inflammatory process in the one region does not involve the other as a rule. A pharyngitis involving the lower pharynx is, I think, a very rare disease, and when met with, is not connected with any morbid condition of the upper pharynx, but rather with some disturbance of the food-tract, such as a gastritis, etc.

The lower pharynx, as before remarked, is very scantily supplied with glands, and yet in the performance of its functions it demands an abundant supply of mucus, in order that it may be kept sufficiently lubricated to allow of the easy passage of food in deglutition. Gland structures are exceedingly delicate, and liable to injury on exposure. The lower pharynx is perhaps the most exposed region of the mucus tract; it is therefore a hard, dense membrane with but few glands, In order to compensate for this deficiency it is surrounded on three sides with large aggregations of glands, one on either side between the pillars of the fauces, another immediately above in the vault of the pharynx, constituting in the one case the faucial tonsils, in the other the pharyngeal tonsil. The sole and only function of these masses of glands which constitute the three tonsils is, I believe, to supply mucus to moisten and lubricate the lower pharynx, and the design of Nature in so locating them has been most wise, for had the lower pharynx been endowed with glands sufficient for its demands, disease occurring in them would be attended with far graver consequences than attend morbid conditions of the gland arranged as we find them.

The minute anatomical structure of the faucial and pharyngeal tonsils have been so often described that further allusion to them need not be made. Their resemblance is so clear that the only difference in structure is easily accounted for by the fact that the pharyngeal tonsil is protected from

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any impact of foreign substances, and is therefore of a soft and spongy consistence, and contains connective tissue, less in amount and less firmly organized than the faucial tonsils, which are subjected to much harsher usage in the act of deglutition.

From a pathological point of view we find still further grounds for grouping the three tonsils together, for the same morbid processes which occur in the faucial tonsils are met with in the pharyngeal tonsil. These are: acute inflammation; chronic inflammation, resulting in hypertrophy; acute follicular inflammation; croupous inflammation, and diphtheritic inflammation.

Acute tonsillitis is a name generally given to quinsy. I shall endeavor to show later that quinsy is not a disease of the tonsil, but is an inflammation of the cellular tissue of the soft palate or neighboring parts, and that phlegmonous inflammation does not occur in the tonsil. As a matter of fact, therefore, the only form of acute inflammation met with in the tonsil is a catarrhal inflammation, viz., one attended with hyperæmia, swelling, and hypersecretion. This is usually described under the term subacute inflammation. In deference to common usage, therefore, I use the usual nomenclature.

Subacute tonsillitis.—This in the faucial tonsil consists of a mild form of inflammatory action characterized by swelling and hyperæmia of the glands, and is the result, generally, of exposure to cold. The constitutional disturbance is not great, there being, as a rule, a mere feeling of general malaise with chilly sensations. The tonsils are swollen to twice or three times their size in the quiescent state, and project into and encroach upon the isthmus of the fauces, two red, angry-looking masses. The palate may be involved in the hyperæmia, but there is no notable swelling beyond the tonsil proper. The attack is not of any serious import, and runs its course in from four to seven days. The predisposing cause is enlarged tonsils, and it occurs in children more frequently than in adults, simply for the reason that in children enlarged tonsils are most frequently met with.

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Subacute tonsillitis occurs in the pharyngeal tonsil with the same frequency as in the faucial tonsil; it is attended by the same constitutional symptoms, a mild febrile disturbance, and no more; and it is caused, as a rule, by exposure to cold. The main predisposing cause is an enlarged pharyngeal tonsil. It occurs most frequently in children, runs its course and subsides in the same way as the faucial disease. The only difference in the two affections is in the symptoms, which differ merely from the location of the morbid process. As far as I know, the affection has never been described under the above heading, although Meyer, in his original article on "Adenoid Vegetation in the Naso-pharyngeal Cavity,"* described their tendency to sudden attacks of turgescence, by which their size varied greatly at different examinations.

Löwenberg† and other writers allude also to the same symptom. It will be easily understood how, in the case of a mild inflammatory process occuring in the pharyngeal tonsil, the symptoms will be mainly nasal. There is apparently a cold in the head. The nasal passages are obstructed, the voice becomes affected, changing to what Meyer calls the dead voice, its nasal resonance is destroyed, and there is more or less discharge of mucus or muco-pus into the fauces. The attack is what is usually regarded as cold in the head, and is often called an acute coryza. This, I think, is a frequent error. An acute inflammation of the nasal mucous membrane in children is very rare. As before remarked, the glandular structures are the parts generally attacked in children and not the mucous membrane proper, and their colds, if in the throat, are in the faucial tonsils, and if in the nasal passages, are in the pharyngeal tonsil rather than in the nasal membrane. The attack subsides in a few days, as in faucial disorder, its frequent recurrence, however, should call attention to the probable existence of the chronic disorder which is in most cases the predisposing cause of the attack.

* Medico-Chirurgical Transactions, vol. liii., London, 1870.

† Les Tumeurs Adénoïdes du pharynx nasal.

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Acute follicular tonsillitis.—The epidemic of this disease, which prevailed to such a great extent last spring, and indeed which has prevailed so extensively in the past three or four years, has served to bring it prominently to the attention of all of us. It consists of an inflammatory process, involving one or both tonsils, which is characterized by the exudation into the crypts of the glands of a fibrinous material which fills and distends their cavities. The onset of the attack is marked by a chill, followed by general febrile disturbance of a marked character. The skin becomes hot and flushed, there are headache, pains in the bones, loss of appetite, and all the evidences of a febrile movement far greater than can be accounted for by the amount of local inflammatory action.

In a paper, read at the meeting of the American Laryngological Association in May last, on "The Clinical Significance of Fibrinous Exudations," * I took the ground that this disease is an essential fever with a local manifestation in the throat, something in the nature of one of the exanthemata. I think there is much ground for regarding this as the correct view. In the same paper I call attention to the fact that the same disease occurred frequently in the pharyngeal tonsil. In each case the onset and progress of the disease is characterized by the same symptoms, the only difference being in the locality of the eruption, and in the subjective symptoms with reference to pain in deglutition, etc.

Croupous tonsillitis.—During the prevalence of follicular tonsillitis we meet frequently with cases in which the attack is marked by the same group of local and constitutional symptoms, with the exception that an inspection of the fauces reveals, in place of the small pearly white spots on the tonsil, a broad membrane covering more or less the whole face of the gland. This I regard as the same disease as the former, with an eruption which is more marked or efflorescent. The exudation which in the former case confines itself to the crypts of the glands, in the latter fills and

* New York Medical Journal, May 12, 1884.

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overflows them, forming a continuous membrane. If this be detached from the surface, there will be found beneath it the appearances of the follicular disease.

The same membrane I have frequently observed on the pharyngeal tonsil, and its appearance is attended with the same general symptoms as in the faucial disease.

Diphtheritic tonsilitis.—A diphtheritic membrane on the faucial or pharyngeal tonsil occurs in connection with the blood-poison of diphtheria. Wherever it may be developed, its clinical significance is the same.

Hypertrophied tonsils.—Hypertrophy of the faucial tonsils gives rise to a train of symptoms which are mainly due to the mechanical presence of these glandular masses in the fauces. They occur mostly in young people. Their development is attended by the occurrence of repeated attacks of subacute inflammation or ordinary catarrhal sore throat, and they show a tendency to subside at puberty. Their development also is the result of a purely local morbid process, and is not, as a rule, the outcropping of any of the constitutional dyscrasiæ. If there is any impairment of health, it is to be accounted for by the mechanical action of the growths, in obstructing respiration, disturbing sleep, or otherwise interfering with the natural functions.

Hypertrophy of the pharyngeal tonsil has been described by many writers under the heading usually of adenoid tumors, or vegetations at the vault of the pharynx. It seems to me that a clearer comprehension of this affection would be reached by showing its relation with enlarged faucial tonsils. This form of hypertrophy, like that in the faucial tonsil, occurs mostly in young people; it gives rise to a train of symptoms which are largely mechanical; its development is attended by repeated attacks of subacute inflammation; it is a purely local trouble; it shows a tendency to subside with the attainment of puberty, and in fact in all its aspects is identical with the faucial disorder, except in its location.

In this view, then, enlarged tonsils in either region are simply masses of diseased glands, whose function has in the main been abolished or perverted by the morbid process

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which has fixed itself upon them. If the hypertrophic process is limited and the tonsils are of small size, giving rise to no untoward symptoms, either by their mechanical interference with function, or by exciting an abnormal discharge from the parts, they require no treatment. If, on the other hand, the hypertrophy has gone to the extent of developing a glandular mass, which by its presence interferes with the function of the parts, or which in any way gives rise to serious symptoms, it seems to me that there should be no question as to the proper remedy. They are diseased structures and should be extirpated. This rule, I think, should apply whether we have to deal with an exceptionally large mass, or with a single follicle not larger than a split pea. As regards any local medication I believe it to be absolutely inert in reducing genuinely hypertrophied glands. It is sometimes said that Nature placed these tonsils in the throat, and that they should not be removed. Nature certainly never put them there.

Perhaps one of the most remarkable suggestions ever made in regard to the tonsils was that of Penrose, that their removal might result in a loss of virile power. This strange suggestion has been so completely answered by Daly,* that I only allude to it as a curiosity. It is sometimes suggested that a portion of the tonsil might be removed, but not all. I see no more reason for this than for the removal of only a portion of any other morbid growth, a fibroid for instance. The danger of hemorrhage after tonsillotomy has often been urged as an objection to the procedure. This danger is, I believe, overestimated. Literature records no fatal case, as far as I know, with the exception of those cases in which the carotid artery was cut. I cannot conceive of an intelligent operator making this blunder. Furthermore, it should be stated, hemorrhage never occurs in the operation upon children. The nutrient artery of the tonsil in young people is small and its walls collapse easily. In adults, on the other hand, hemorrhage after tonsillotomy is almost the rule. This is often exceedingly troublesome. I have never seen a

* Medical and Surgical Reporter, December 15, 1883.

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case, however, in which the bleeding was not promptly arrested by the application of a wire heated to a dull, red heat. This is a simple procedure and should be resorted to always in preference to the ordinary styptics, which are useless in controlling arterial hemorrhage, and the only troublesome bleeding which occurs in these cases is from the nutrient artery.

As regards the removal of the pharyngeal tonsil I have nothing to say in addition to what I have already given before the Academy* two years ago.

Quinsy.—I have already alluded to quinsy as a disease of the cellular tissue of the fauces rather than of the tonsil. Phlegmonous or suppurative disease does not occur in glandular structures, but belongs rather to areolar tissue. It is true that we occasionally meet with small abscesses in the glands of the tonsils or in other portions of the mucous membranes of the air passages, but they are small abscesses, as a rule, which result from the occlusion of a gland, and are not phlegmonous in character. For three years I have entertained the view that quinsy was not a disease of the tonsil, and in that time have carefully watched and examined the cases which have come under my observation, and I do not recall a single instance in which I have not been able to demonstrate conclusively to my students, or others who have been present at my clinic, that the tonsil was not involved directly in the inflammatory process. The tonsil oftentimes presents a red and angry appearance, but this is always secondary, and due to the fact of its nearness to the phlegmon. Again, the tonsil is occasionally very prominent, being lifted from its bed, and at times projecting far toward the opposite side of the fauces. This is due to the phlegmon occurring behind it. The disease I believe to be an acute cellulitis of the areolar tissue of the fauces. In the very large majority of cases it occurs in the soft palate; in others it occurs in one or the other of the pillars of the fauces; and in still rarer instances, in the pharyngeal wall. Furthermore, the cause of quinsy I believe to be in very

* Growths in the Nasal Passages, Medical Record, January 13, 1883.

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many cases the rheumatic habit. This view is an old one, and has been maintained by many writers on the subject. I had not paid any close attention to this view until Dr. Fowler * called renewed attention to the connection between rheumatism and quinsy, and reported a number of cases which supported the view. Dr. Fowler also suggested the value of the salicylates in the treatment of the disease.

For three years I have treated all my cases of quinsy as cases of phlegmonous inflammation of the submucous cellular tissues, and as probably due to the rheumatic habit. The following summary is offered as affording some points of interest: The whole number of cases seen has been 133. Males, 88; females, 45. Under ten years, 3; ten to twenty years, 30; twenty to thirty years, 61; thirty to forty years, 11; over forty years, 12. The oldest case was sixty-nine years, the youngest nine months. This latter case was a female child which I saw the fourth day of the attack. The case had gone to suppuration and I opened the abscess in the soft palate.

In the 133 cases the phlegmon was in the soft palate in 115 cases; in one or the other of the posterior pillars of the fauces in 11 cases; beneath the tonsil in 2 cases, and in the wall of the pharynx in 2 cases. These latter two cases would have been called perhaps retro-pharyngeal abscesses. They were unquestionably quinsy. In many cases there was the clinical history of attacks of rheumatism, either arthritic or muscular. Unfortunately my notes give no accurate information as to the proportion of these cases, but I think it was fully sixty per cent.

If the effect of remedies is to be regarded as any evidence, the connection between the two diseases is still further evidenced by the fact that so large a number of cases of quinsy were aborted by the early administration of the salicylates. These cases were mostly seen at my clinic at the out-door department of Bellevue Hospital. Many of them came several days after the onset of the attack. Of those whom I saw within the first thirty-six hours, the attack was aborted

* London Lancet, December 11, 1880.

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by the administration of the salicylates in a majority of cases. In those cases in which the attack was not aborted, suppuration seemed to be very much hastened. The form in which the remedy was administered was as follows:

℞. Sodæ salicylatis . . . . ʒ iij.
Aquæ . . . . . ℥ vj.
M. Sig.—One tablespoonful every two hours.

Last spring Dr. Barker suggested to me the value of bicarbonate of soda locally applied. The soda is to be taken up on the moistened finger and plastered over the inflamed surface every ten or fifteen minutes. I have since then made use of this remedy in connection with the salicylates, and in one or two cases its action has been most gratifying. I am not prepared, however, to abandon the use of salicylates in favor of the soda. In several cases also in which the quinsy habit has existed I have given the above prescription, with directions to commence its use immediately upon experiencing any symptoms of these attacks. These were cases in private practice. In no one of these cases has there been an attack of the disease. If the attack is not aborted by medication, it seems to me that it is of importance to us to recognize and treat the disease, as far as the local process is concerned, as an abscess in any other portion of the body —in other words, to treat it on general surgical principles. I think that the importance of introducing the finger into the fauces is not sufficiently recognized. No case—no case of quinsy, certainly—should ever be treated without it. By introducing the finger into the fauces, the condition and location of the phlegmon can be determined, and the occurrence of suppuration and the proper point at which to introduce a bistoury recognized. In this manner the treatment of a quinsy becomes a very simple matter, and does away with the use of gargles, inhalations, sprays, fomentations, etc., which oftentimes add to the discomfort of the patient rather than to his relief.

In conclusion, I have only to say that if I have brought

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forward any suggestions which are at variance with old-established teaching, they are offered very modestly, but still as convictions which have been the result of a somewhat large experience. In acting upon them I am confident that I have obtained better results in the treatment of throat diseases than in following the older doctors.

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THE THERAPEUTICAL EFFECTS OF THE INTERNAL ADMINISTRATION OF HOT WATER IN THE TREATMENT OF NERVOUS DISEASES.*

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A MUTUAL dependence may often exist between disordered states of the thoracic, abdominal, and pelvic viscera and some forms of functional disturbance of the nervous system. This is well recognized to-day by all neurologists.

The fact has been demonstrated, by a long array of clinical observations and physiological experiments, that the nerve-centres are not to be considered clinically as independent organs. The brain and spinal cord are to a certain extent but servants of the other viscera. On the other hand, the nerve-centres are occasionally the masters. They perform some of the functions (properly attributed to them in one sense) only in response to different forms of impressions conveyed to them from without. By means of vasomotor and other varieties of nerve-filaments, sensory impressions made upon peripheral organs are now known to affect the general blood-pressure; to accelerate and arrest the action of the heart; to induce spasmodic and paralytic disturbances in special physiological centres of the brain and spinal cord; to create localized phenomena of defective nu-

* A paper read before the New York Academy of Medicine, October 16, 1884.

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trition and assimilation; and to excite reflex nervous symptoms in parts far removed from the seat of peripheral irritation. We also know that the growth of the viscera, as well as their physiological functions, hangs upon a reciprocal relationship between them and the brain and spinal cord.

I mention these facts as a preface to my remarks this evening, because they will be shown to have a direct bearing upon a theory which I shall advance respecting the action of heat (when introduced into the stomach) upon the various organs and tissues.

The tendency of the age, particularly in neurology, seems to me to manifest itself in endeavors to discover new medicinal agents, often to the neglect of simple remedies whose influence upon the system has not yet been thoroughly tested. Among the latter, to my mind, hot water stands pre-eminently at the head.

It may seem a startling assertion, but it is nevertheless a fact, that more persons among the laity are to-day taking hot water for various ailments than any single drug in our pharmacopœia. In many instances they may be doing so injudiciously and without proper grounds; but that they are employing this agent, for actual or imaginary ills of the flesh, by thousands, can not be denied by any one acquainted with the facts.

The spread of the belief in the therapeutical value of hot water has travelled chiefly by word of mouth, as I know of only two articles in medical literature that have materially helped to popularize it. To employ hot water therapeutically could not have become so universal a custom unless great benefit had been bestowed by it upon many. My own experience with it in the treatment of nervous diseases has led me to call the attention of the profession again to its use as a therapeutical agent, and to point out some of the results that may be expected from it, and also how it should be administered.

In no work upon therapeutics or neurology have I been able to find any record of experiments made to determine either the physiological or therapeutical effects of hot-water

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drinking. In most of them no reference even is made to it as a remedy.

Heat has been employed as a therapeutical measure in various ways for centuries. As a hæmostatic, hot water has lately become indispensable to the surgeon, although the red-hot iron was employed by Galen, and is still used to check hæmorrhage from bleeding mucous surfaces. As an antiphlogistic, heat is a household remedy. Who of us has not employed it in fever, inflammatory conditions, and many of the nervous disturbances of childhood that accompany these conditions?

Different temperatures are known to have widely different therapeutical effects:

1. Moderate heat, when applied to living tissues, causes a determination of blood to the part, with dilatation of its blood-vessels and an increased rapidity of the blood current. As examples of this action, I might cite the effects of the poultice upon suppuration, of the hot hip-bath and vaginal douches upon the catamenial discharges, of the hot bath upon the skin, and many others.

2. A higher degree of temperature, on the other hand, tends to cause contraction of the blood-vessels and to diminish the amount of blood in the tissues; hence the action of very hot water as a hæmostatic.

3. Intense heat, as illustrated in the application of the actual cautery to the skin (so lightly even as to cause neither vesication nor pain), produces a very marked contraction in the blood-vessels of organs and tissues that lie adjacent to the part cauterized. It is believed to-day that this effect is produced through the agency of the vaso-motor system of nerves, and that the contraction of the blood-vessels is a direct result of the shock produced upon peripheral nerve-filaments by the intense heat employed.

We have clinical knowledge that the actual cautery will produce a return of the normal habit of sleep, after chronic cerebral hyperæmia has produced wakefulness for years, if employed at the upper part of the neck. It will relieve the symptoms of spinal congestion, as no other known remedy will. It will often produce secretion by the kidney if ap-

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plied to the loins, when congestion of that organ has led to complete suppression of urine. It will arrest neuralgic pains immediately in many cases. Finally, it will apparently exert an alterative change in tissues when persistently applied. In many forms of nervous diseases, this method of employing heat is recognized as an important aid in treatment. The cautery apparatus is to-day one of the most valuable additions to the neurologist's outfit. It is almost indispensable in the treatment of nervous diseases.

The benefits that result from the internal use of hot water, to which I shall call attention, must be due, in part at least if not wholly, to heat. Some of its effects are manifested, almost immediately, in organs not connected directly with the digestive apparatus. I will suggest further on in this article a theoretical explanation of these effects, based upon anatomical data relating to the nervous system.

RULES FOR ADMINISTRATION.

Let me state first, however, the method which should be rigorously followed in taking hot water for its remedial effects.

1. The water may be taken in doses of from one goblet to one and a half. An ordinary goblet contains about ten ounces. The dose must be modified in accordance with its effects.

2. *It must be drank hot*, and not warm (110° to 150°). If necessary, fifteen minutes or more may be consumed in sipping a gobletful. Wooden cups prevent the water from cooling quickly. The water may be flavored with lemon, sugar, salt, ginger, etc., if necessary,* but it becomes very agreeable to the palate without such after the patient has taken it for a short time.

3. The dose must be taken *one hour and a half before each meal* with absolute punctuality, and one at bed-time.

* Cinnamon, clover tea blossoms, sage, aromatic spirits of ammonia, and sulphate of magnesium have also been suggested. I often introduce a teaspoonful of Carlsbad salts into the morning dose, to relieve constipation, when it is obstinate.

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My patients have the first dose brought to their bedside and consume it before rising. The passage of the fluid into the intestine, or its absorption before the meal, is insured by this rule. The quantity taken daily must be modified according to the effects produced.

4. *The temperature of the water should be increased* as fast as the patients can bear it. It is remarkable how high a degree of heat some patients can endure after taking hot water for months. At first, such a temperature would blister the mouth. Below 110°, the heat is not sufficient, as a rule, to have any therapeutical effects, save as an emetic.

5. The administration of hot water *must be continued for at least six months*, in order to get its full effects. It will be some weeks, as a rule, before any beneficial effects become markedly apparent. It is not sufficient for a test of its value that it be given at irregular intervals, with variable degrees of temperature, and with no regard for the specific gravity of the urine and the proportion of solid ingredients secreted by the kidney.

6. The dose should be determined largely by the specific gravity and general character of the urine. If it falls as low as 1.010, the dose should be reduced, if necessary, to one half a pint. If it reaches 1·030, the dose should be gradually increased to a pint, provided that the daily quantity of urine has not been decreased to a point below the normal standard by profuse sweating. The average urinary secretion of a healthy adult should vary between thirty-five and fifty ounces for twenty-four hours. It may occasionally reach two quarts. The object of the treatment should be to bring the specific gravity of the urine to the standard of health, 1.010–1.022, and to keep it there.

7. The *use of cold fluids*, in the form of beverages, must be absolutely prohibited. Many patients have told me, after following this treatment, that they will never from preference drink cold water again.

8. A *restricted diet* is often necessary to the full effects of the treatment, in some forms of nervous derangements. It is my custom with some patients to forbid all sweets, pastry,

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fresh bread in any form, and fats. In other instances I employ the meat diet exclusively, the fatty parts being removed before cooking. The sour wines are not usually forbidden, nor is tea or coffee, unless they are apparently injurious to the patient. The condition of the subject, in respect to flesh, is my guide, as a rule, to the character of the diet prescribed, provided that marked disturbances to digestion or diabetic symptoms are not to be combated. If the patient is ill-proportioned as regards adipose tissue, I aim to reduce the weight gradually to the normal standard. This is estimated on the basis of the height, sex, bony framework, etc. Cutting down the saccharine and starchy elements of food will effect this reduction in weight rapidly. If the subject is thin and poorly nourished I adopt the opposite plan, often with good results.

THE EFFECTS OF THE TREATMENT.

1. On drinking a goblet of hot water for the first time, a sense of warmth within the stomach will be produced, unaccompanied with nausea. This is not the case with warm water, since emesis often follows its introduction into the stomach. Hot water increases downward peristalsis; warm water reverses peristalsis and induces vomiting. Eructations of gas from the stomach commonly occur within a few minutes after the first dose of hot water. This effect may persist for some weeks. Excessive eructation indicates that fermentation of food occurs after eating, from defective alimentation.

2. The *skin* soon shows the effect of the heat. A gentle glow with a tendency to perspiration is developed rapidly. This is diffused over the entire body. Coldness of the extremities is often very much benefited, and in a short time, by this treatment. The circulation of the body appears to become more uniform. It is rational to suppose that the viscera are often thus relieved of engorgement, and aided in the performance of their proper functions. Perspiration so induced is unquestionably associated with an increased sup-

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ply of blood to the skin, since it is accompanied with a sensation of increased warmth.

3. The *kidneys* exhibit marked effects of this treatment early. Almost immediately, the quantity of urine is increased. It is usually improved also in its proportion of solid ingredients, provided the organs are inclined to be sluggish. If, on the other hand, diabetic symptoms exist, the specific gravity is frequently modified and the quantity reduced. One patient, who was lately placed under my care with marked saccharine diabetes and symptoms of cerebral hyperæmia of a severe type, has been perfectly cured by hot water, restricted diet, and simple tonics. He had previously tried all the known remedies (and a diabetic diet as well) for years without benefit. I was called in consultation about a year ago in a similar case, and the patient recovered under this treatment. He had symptoms of an alarming character and had previously found no relief. Both of these cases were, in my opinion, of neurotic origin. The head symptoms, which were very marked in both, disappeared under the same treatment, although the actual cautery had been tried thoroughly and had failed to arrest them.

4. The *accessory organs of digestion* (the liver and pancreas) seem to be stimulated by the internal use of hot water. Gradually, under its continued use, the bowels move regularly and the fæces eventually become soft and yellow in color.* Flatulence and constipation are enumerated as things of the past. I have known hæmorrhoids of long standing to disappear under this treatment. Chronic diarrhœa was thus arrested by me in one instance. It was apparently due to extreme nervous debility.

5. The *nervous system* seems to be profoundly impressed by a prolonged use of this agent. Especially is this the case among that class of patients who suffer from the effects of hyperæmia and anæmia of the brain and of the spinal cord and spinal nerves. Perhaps there are no greater sufferers than are found among this class. I have at present under my care a lady who, for twenty years, has been con-

* At first the fæces are made very black by the washing down of the bile.

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fined almost constantly to her house from neuralgic attacks which have withstood all medicinal agents. Under the use of hot water and the meat diet (she is somewhat fleshy) the symptoms have shown a marvelous improvement within one month. Her paroxysms are already very much diminished in their severity, and are comparatively infrequent. I hope to see them disappear entirely.

I have at present under my charge several patients suffering from locomotor ataxia. I am treating them by the internal administration of hot water, in conjunction with the actual cautery, nitrate of silver, and the iodide of potash. Sufficient time has not yet elapsed, since the hot water was prescribed, to state positively that permanent benefit has been derived from it, but I am convinced that very marked improvement has followed its use in two cases. It is my intention to publish subsequently the records of all of these experiments. Thus far the efforts of neurologists to arrest progressive sclerosis of the posterior columns of the spinal cord have been unsatisfactory, and the question of a direct dependence of this condition upon a syphilitic taint must probably (to my mind) be decided in the negative.* Pathological research to date has not aided us in determining its ætiology; hence its treatment, as yet, is purely empirical, and experimentation regarding its cure is particularly to be desired. I can only say in this connection that one patient, whom I have at present under observation, came to me unable to walk, save by the aid of two canes and a body servant. Already one cane and the servant have been dispensed with, and the patient suffers less than he did from anæsthesia of the limbs and lightning pains. Another, who had diplopia, and marked incoördination of movement, is no longer troubled with imperfect vision and walks with more confidence. I am aware that similar results have been recorded

* The statistics upon which syphilis has been classed among the ætiological factors of ataxia are open to severe criticism. Our present knowledge of the morbid changes produced by syphilis upon the cerebro-spinal axis does not appear to sustain the view that systematic lesions of the cord are ever directly produced by it.

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without recourse to the hot-water treatment, but in these cases it seems to have been a marked factor in the amelioration of the symptoms. If it could be proved that this agent exerts a remedial influence upon gray degeneration of the spinal cord, what a boon would be conferred upon thousands who are now suffering without much hope of cure.

The paucity of literature upon this therapeutical agent renders statistics collected from the experience of others impossible.

This paper is necessarily but a record of my own experience. I may be pardoned for apparent egotism, therefore, if I refer here only to cases which have been intrusted to my care.

Within the past five years I have succeeded in curing three cases of gastralgia, where the paroxysms have been frequent and terribly severe for a long time. In one of these (that of a gentleman of great will and courage) the severity of the pain would frequently cause fainting. In another (that of a lady of forty-five years of age) the gastric pain had been constant for years, and gastric cancer had been suspected to exist.

Patients with neurasthenia are almost invariably benefited by the hot-water treatment. In many instances I have witnessed a rapid disappearance of all the abnormal nervous phenomena. Two cases of local anæmia of the brain, with transient aphasia, have been lately observed by me. Both patients recovered under the hot-water treatment and tonics. The latter had been tried alone in one of them, for some premonitory symptoms, without marked benefit.

To cite all of the cases in which I have employed this agent, either alone or in combination with other methods of treatment, would exceed the limits of this article. I believe, however, from my observations to date, that the use of hot water will prove of great value in neurasthenia and some of the functional nervous derangements.

My observations of its effects upon epilepsy and chorea are as yet imperfect, and therefore lead me to no positive conclusions.

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I think it not impossible, moreover, that the continued use of this therapeutical adjunct may tend to modify, if not arrest, some of the progressive degenerations of the cord. I am not prepared to make any assertion to that effect, however, although I am testing it in some aggravated cases, in connection with the use of the cautery and medicinal agents. This field has been previously referred to.

THEORY OF ITS ACTION.

It is a temptation to speculate in regard to the probable channels through which the effects of hot water upon the system are exerted. To my mind, the neurotic theory is the most plausible. I believe that the nerves of the stomach, and possibly the solar plexus (the ramifications and connections of which with the central nerve-centres are not fully determined), are directly influenced by the heat introduced into the empty organ.

Mayer and Pribam have already shown that electrical and mechanical irritation of the walls of the stomach can produce a reflex contraction of the cerebral vessels. Kussmaul has demonstrated that similar effects may follow faradization of the cervical sympathetic. Nothnagel and Loven have proved that irritation of peripheral nerves exerts a marked effect upon the arteries.

The solar plexus lies immediately behind the stomach, and is connected with all of the abdominal viscera. The splanchnic nerves of either side, and probably the terminal filaments of the right pneumogastric nerve, enter into its formation. It is therefore connected directly with the brain and the main sympathetic cords, and indirectly with all of the organs of the body. It is the most important of all the sympathetic plexuses, as well as the largest. Why are we not justified in believing that the effect of stimulation of this plexus, by heat through the stomach, will accomplish that which electrical stimulation of the stomach itself has been proved to attain? Are we not warranted in attributing the warmth of the skin, the perspiration, the increased activity of the kidney, the stimulation of downward peristalsis,

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and the other effects of this agent, to a remote influence upon the vaso-motor nerves or their centres? If so, why is the view irrational that cerebral and spinal hyperæmia and anæmia may be controlled and brought to the normal standard by the same means?

POINTS IN ITS FAVOR.

This method of treatment has certainly one thing in its favor that few possess—viz., it is harmless. Because its remedial effects are slow in some cases, it is no proof that they are not doubly permanent. Are we not convinced daily that many of the more common nervous diseases are obscure in their origin, and that the *removal of the cause* might hasten recovery, if we could only detect it?

Most of our nationality chill their stomachs with ice-water between meals and during the act of eating. Who would think of feeding a horse, and placing a bucket of ice-water by his side? The question may well be raised if this one habit alone has not done more harm to the nervous systems of men than tobacco or alcohol, the use of which is mentioned in all text-books as an ætiological factor in nervous diseases.

I believe that the success of the hot mineral waters, as consumed at the famous springs of this country and Europe, for chronic diseases, depends more upon the employment of internal heat as a therapeutical agent than upon the mineral ingredients of the waters themselves. I do not advance this view to disparage the medicinal qualities of these waters, but to bring into prominence the view that heat, restricted diet, and enforced mental and physical rest, are probable factors in the remarkable cures that are brought about by their use.

In anticipation of argument, I might say that I am well aware that this agent is not a new one, and that it is not always followed by the effects enumerated. Who of us, however, has not met, in professional experience, cases where opium has failed to produce sleep? Yet who doubts that it is one of our chief hypnotics? I lately encountered

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a case where sixty grains of morphine were consumed daily, by the mouth, and constipation had never existed. Yet who would dispute the statement that this drug tends, as a rule, to restrain the free action of the bowel, even in small doses? Because the public are to-day crazed over hot-water drinking, and are asserting for it medicinal virtues to which it has no title, are we justified in denying for it a fair trial in those diseased conditions that withstand the routine medicinal treatment recommended by text-books? We have undoubtedly yet to learn exactly to what extent it exerts a remedial influence upon the kidneys, digestive organs, vascular apparatus, skin, and the principal nerve-centres, but that it is potent in some cases can not be disputed. *No pretension is made for it here as a panacea.*

Again, it may be argued that, in some of the cases to which I refer, this agent has been employed in conjunction with restricted diet, the actual cautery, the internal administration of tonics, etc.; and that some of the benefits may justly be attributed to these factors in the treatment. To this criticism I would reply that, in some of these cases, the hot water has not been used until the other agents spoken of had been thoroughly tried, and that improvement has been markedly hastened by adding it to the previous treatment. In one diabetic case reported, the symptoms were not controlled by drugs or restricted diet; but the excretion of sugar ceased in a few weeks when hot water was ordered as an adjunct to a diet from which all starchy and saccharine foods were expunged.

A third class of critics, whom I as well as most of those present have often encountered in argument, are those who expect immediate results, and who throw every agent overboard in case they fail to get results as promptly as they had expected. They argue that patients will not take any form of treatment with regularity which does not show rapid results. Admitting for the sake of argument (and on no other ground) that there may be a shadow of truth in this statement, I would reply that (provided the patient is prepared at the first visit for slow results, and informed in re-

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spect to its action) this objection can be overcome. I would suggest, furthermore, that the use of hot water does not preclude the employment of opiates and other drugs, when the exigencies of the case seem to demand them. One reason why this agent may not be productive of good results, even in favorable cases, is that it is not given systematically and in accordance with the rules previously suggested. Hot water is unquestionably not conducive to health, if poured into the stomach without restrictions as to quantity and the proper time for its administration.

CONCLUSIONS.

In summary, I would urge a thorough trial of this therapeutical agent by the profession on the following grounds:

1. It is harmless, if properly administered. A degree of temperature that can be endured by the mouth will not impair the integrity of the stomach. Absurd as it may seem, I have heard this argument used by men of intelligence with every appearance of sincerity. Many of us drink coffee and tea at an equally high temperature, and in as large quantities, as are compatible with the hot-water treatment.

2. Its effects are comparatively uniform, provided it be given for a sufficient period. Exceptions prove a rule. Isolated cases may be occasionally encountered where the results as stated do not occur.

3. It seems to exert a curative influence upon many of the chronic diseases that influence and disturb the proper assimilation of food. Some of these are important factors in the development of nervous derangements. I restrict my statements for hot water as yet chiefly to the cure of these diseases, because I have not scientific data upon which to base a broader statement. Subsequent investigation can alone decide to what limits the remedial use of this agent should be restricted.

4. It appears that the curative influence of hot water is not usually transient. In many of my cases the symptoms have shown no tendency to return when once checked by its use, provided that the patient's indiscretions do not lead to a relapse.

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5. It may be employed as an adjunct to all recognized methods of treatment, without detriment to the patient.

6. It exerts a marked influence upon vascular disturbances of the nerve-centres. Especially is this the case, in my experience, with those subjects that suffer from cerebral hyperæmia and anæmia. I have seen some remarkable results follow the protracted use of the hot-water treatment in headache, vertigo, neuralgia, insomnia, and other conditions produced by vascular disturbances.

7. In diabetes, and in some kidney derangements, I have seen the most happy effects follow the internal administration of hot water. Its action as a diuretic is quite remarkable in some cases. It seems also to influence the secretion of urinary salts, since the specific gravity is modified often to a marked degree. The specific gravity of the urine is my guide in regulating the quantity of hot water for daily consumption.

8. As a laxative, hot water has a slow but decided action. The fæces are at first rendered black, from an excess of bile, but they gradually change to a yellow color, and become more like that of the infant. It seems to be a justifiable deduction, therefore, that the functions of the accessory organs of digestion are made active by its use, and brought to the standard of health.

9. The skin is stimulated by the use of this agent, and the cutaneous circulation is apparently rendered more uniform. I have seen the hue of the skin in disease altered by it, and eruptions of a chronic character markedly benefited.

10. From a few experiments which I have made with reference to the effect of this agent as a preventive of sea-sickness, I am led to believe that it should be employed for from four to six weeks preceding an ocean voyage, in accordance with the rules given earlier in the evening.

In conclusion, I would state that, if I have been led to express views that may appear extreme to many, it is because my convictions are based upon clinical observations of no inconsiderable magnitude. I have seen my previous failures in treatment turned by this agent into brilliant suc-

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cesses in some instances. In others, symptoms have been ameliorated by the use of hot water more rapidly than by methods of treatment universally recommended by text-books. To what limits the value of this agent will be restricted, as a therapeutical adjunct, the results of collected observation and experience to date can not fully determine. I shall await with interest the published results of the experience of others, who have doubtless employed this agent in various forms of chronic diseases, and especially those bearing upon the department of neurological medicine.

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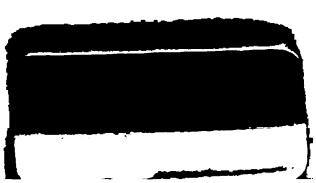

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